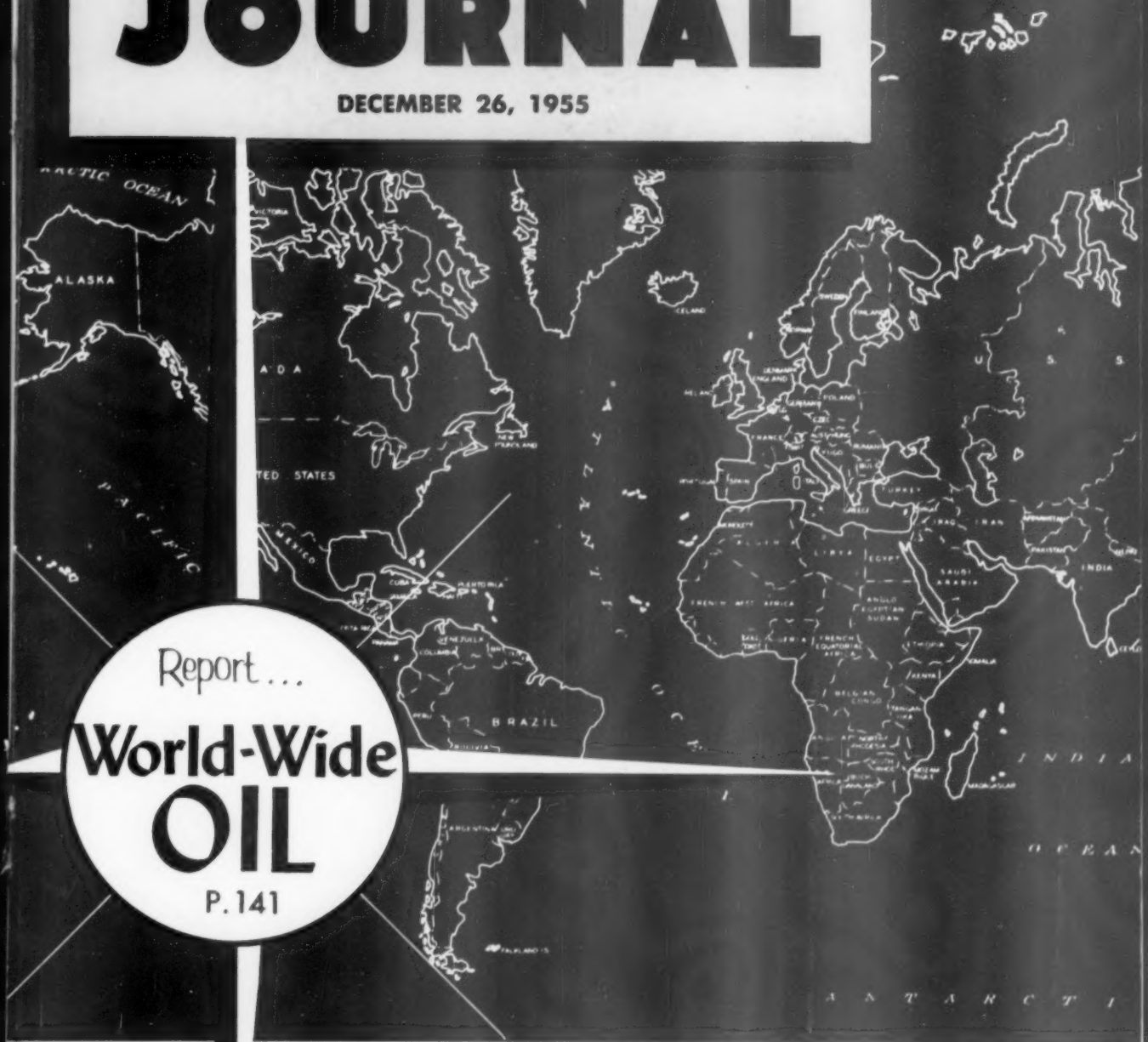
the OIL AND GAS JOURNAL

DECEMBER 26, 1955




Report...

# World-Wide OIL

P. 141

## Offshore Payoff Will Start in '56 • p. 120

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# A glance ahead . . . at press time

## These trends will make TOMORROW'S NEWS

**Hydraulic fracturing will increase even more in 1956.** The number of jobs per month is now double that of 2 years ago, and there's no sign of a letup.

It is now estimated that treatments this year will total nearly 50,000—almost as great as the total number of wells drilled.

**Internal coating of gas lines with epoxy resin promises** to get a much bigger play next year.

One maker of epoxy paints expects to see 1,000 miles of new line coated in '56. There also are signs that some major transmission companies will coat lines already in the ground.

Better-than-expected results on Transco's 36-in. line is one reason. Talk in the industry is that Transco has achieved a 3 per cent increase in flow efficiency compared with uncoated lines. On this basis, savings in horsepower would give a quick payout. A possibility: Steel companies may install coating yards at pipe mills.

**Refiners are learning new blending tricks** to perk up octane numbers as octanes get harder and harder to come by.

With six or more blends to play with, the problem gets tough for human minds. So, electronic brains are being put to work to determine how these various stocks can best be put together to realize the most in octane rating, volatility, and other qualities for both premium and regular.

**Sinclair is putting remote-reading gages** on its production tanks in Wyoming to make it easier and quicker to gather morning stock reports.

Information will be transmitted by wire line to the division production office, where it will be recorded by an electric typewriter. Though not planned for the immediate future, designers foresee the day when stock reports will be sent automatically by the same equipment to the company's central offices in Tulsa.

**Some infrequently used oil-production methods** are going to find wider use in the near future.

Much thought currently is being given to advantages of gas lift and, in particular, the ball pump and free piston. These methods look almost ideal for lifting oil and, in addition, appear extremely effective in preventing paraffin deposition in production tubing. The problem at hand: get the bugs out and make them more practical.

**New cost-cutting improvements in alkylation** haven't appeared as soon as hoped, but they're still coming. Next year should see some developments which will make both types of alkylation attractive to refiners who need to blend alkylate to motor fuel to maintain their octane position.

**Look for independent refiners** to move more and more into the majors' processing territory in states along the Eastern Seaboard. Four refineries are now planned—all by independents. While some may process for the majors, room still will have to be made for members in the crude-imports fraternity.

the OIL AND GAS JOURNAL

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EXPLORATION • DRILLING • PRODUCTION • FIELD PROCESSING

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# WORLD-WIDE OIL REPORT

World-Wide Oil Survey **141-198**

*By Paul Swain and Ray Gibson*

A 58-page section on the status of international oil, written in the Journal's international office in New York. The survey shows that the oil business in most branches of its activity is growing at a faster rate abroad than it is in the United States. The growth rate of the Middle East is especially fast. Total world production is up 11.8 per cent over 1954, and world refining capacity is up 4.2 per cent.

Highlights of Oil's Postwar Growth **199**

*By C. J. Robrecht*

In the period 1946-1954, oil production has increased 57 per cent, and refinery runs have jumped 55 per cent throughout the world.

Australia's Kwinana Refinery On Stream **202**

This 70,000-bbl. refinery, Australia's biggest, has been on stream since early in the year.

Multistage Separation Conserves Crude **206**

*By Morteza Khosrovi*

A recently completed crude-oil separation plant in the Iranian oil fields reduces pressure, removes gas, and relays stabilized crude to outlets 45 and 100 miles away.

West German Oil Continues Expansion **210**

*By A. M. Stahmer*

Production of oil in West Germany is up 19.4 per cent over 1954, and refining capacity is up a like amount.

Naples Plant Refines Middle East Crude **216**

*By G. H. G. Caulton and Staff*

This refinery, almost completely destroyed during World War II, is now processing 60,000 bbl. daily.

Caltex Completes 50 Years in Holland **220**

*By Daniel S. Kerley*

The Pernis, Holland, plant can now process 37,000 bbl. of crude daily. Facilities are modern and up-to-date.

Say It In Arabic **224**

*By Paul Swain*

Arabic is the official language in areas where 3 million barrels of oil is produced daily. Here are some common oil terms and Arabic equivalents.

Kawasaki Refinery Expands **228**

Western Europe's Petrochemical Program **231**

The program has three prime targets: To replace imports from the dollar area, to substitute raw materials formerly produced by more expensive techniques, and to augment existing range of chemical raw materials and intermediates.

British Petroleum Operations Are Far Flung **245**

British Petroleum Co., Ltd. is one of the major units of the world oil industry. Here's a story of its growth and development, and a description of its completely integrated operations.

Five Companies Seek Yugoslavian Oil **255**

*By Vladimir Aksin*

The Yugoslavian oil output has grown from 8,000 bbl. of oil per year to over 1½ million barrels in 1955. Refining capacity has increased from 700,000 bbl. yearly in 1939 to 4,770,000 in 1955.

Asia's Largest Natural-Gas Line Completed **259**

The 348-mile, 16-in. gas transmission line of Sui Gas Transmission Co. was completed this year, a year ahead of schedule. Initial throughput is 37,000,000 cu. ft. daily.

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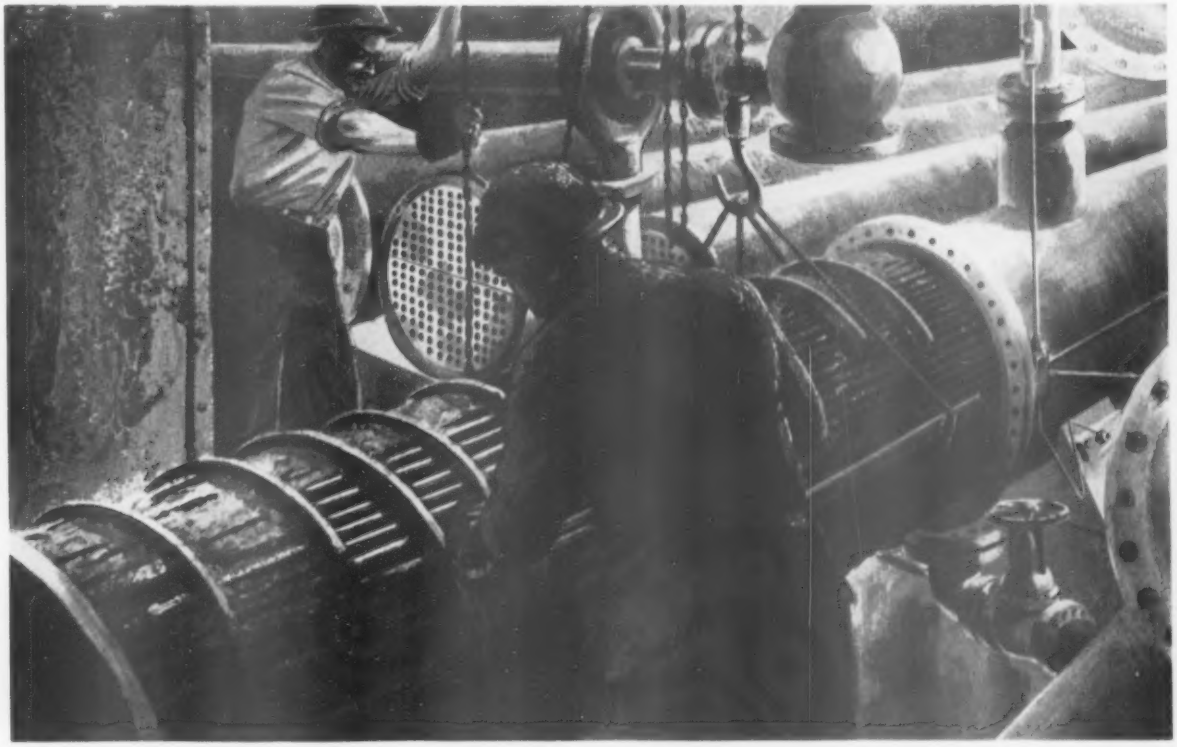

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Fouled heat exchangers are one of the most common causes of refinery downtime and production loss. But now, you can easily reduce many heat exchanger fouling problems with a small amount of Du Pont FOA-2. For example...

### Case history

A major refinery was processing straight-run stock containing about 20% coker distillate. The initial product at 230°F. was flowing through the shell side of the heat exchanger to the pre-heater. The product at 655°F. returned to the hot receiver through the tubes.

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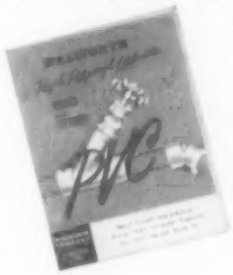
**Walworth PVC Y-Globe Valves** are designed to regulate the flow of alkalis, acids, inorganic salt solutions and other troublesome fluids commonly found in food, chemical and allied industries. They will give exceptional service at temperatures as high as 150° F and are designed for use with schedule 80 pipe. Other features of these valves include: (1) Three chevron, Teflon packing rings give you a leak-proof seal without binding the stem. (2) No useless threads to accumulate troublesome dirt because no stem threads enter the interior of the body. (3) Snap-on spherical plug with ball-to-cone seating arrangement to assure a tight line-contact seal between disc and seat regardless of any minor inaccuracies in alignment. (4) Full 45° angle of stem with center line of pipe to reduce pressure drop and turbulence. (5) Generously designed flow passage at the valve seat for a more even flow. (6) Back seat design allows repacking when wide open under pressure. (7) Polyethylene bonnet gasket to assure a perfect body-to-bonnet seal.

**Walworth PVC Diaphragm Valves** come equipped with neoprene discs. Other diaphragms especially suited to your application can be furnished. "R-2" rubber diaphragms are commonly used in systems handling dilute acids and alkalis. "J-1" Teflon diaphragms are recommended for maximum chemical resistance.

Valve design features: (1) No stuffing box or packing to replace. (2) A resilient diaphragm connected to the compressor by a stud assures a leakproof closure on the body weir or valve seat even when slurries or semi-solids are in the line. Diaphragm easily replaced without removing the valve from the line. (3) Streamlined flow area in valve body makes valve self cleaning and allows fluids to flow equally well in either direction. (4) Separation of valve body from the sealed metal bonnet protects fluids from contamination. Fluids contact only the valve body and diaphragm. (5) Completely enclosed metal bonnet protects stem from breakage and distortion.

**Walworth PVC Fittings** assure uniform thermal expansion of pipe and fitting threads when used on plastic pipe. They eliminate the danger of jammed threads, loose joints and the chance of galvanic corrosion. These screwed pipe fittings are: (1) Designed for use on schedule 80 of plastic pipe. (2) Walls are of uniform thickness accurately molded. Proportions are skillfully worked out in all sizes and types of fittings. (3) Fittings are chamfered to protect the thread and afford easy entrance of the pipe. Long bands provide reinforcement at the points of severest strain.




This booklet contains all the details about Walworth PVC products that you'll want to know. It describes mechanical and thermal properties, working pressures, sizes and dimensions, application and assembly data. For your free copy write to us. Please use company letterhead.

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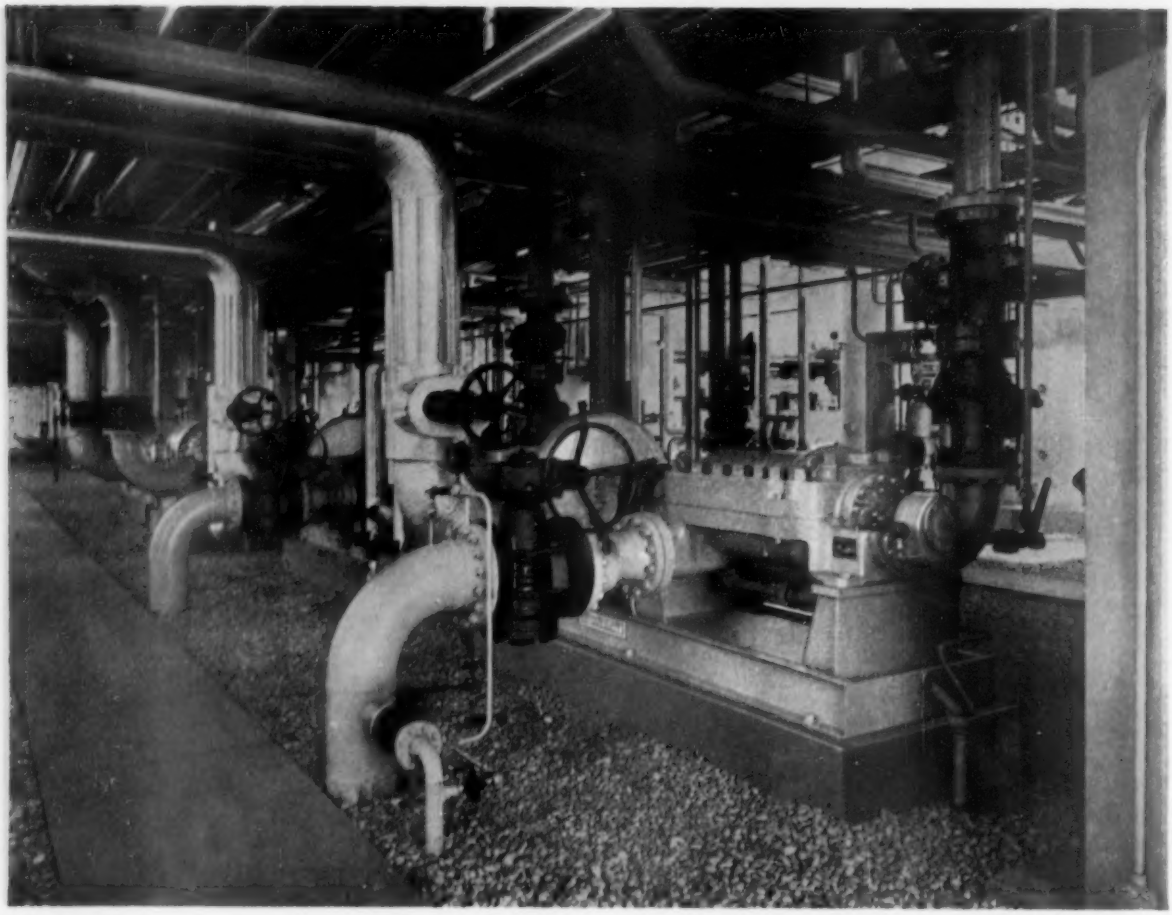

Photo by E. M. Payne

**Ingersoll-Rand HMTA Pumps** were chosen by Cities Service Oil Company. Three turbine-driven 5-stage pumps, with the I-R Unit-Type rotor assembly, serve the two absorption towers at this Blackwell, Oklahoma plant, designed and built by Hudson Engineering Corp. Present conditions call for 1650 gpm of 0.795 sp. gr. lean oil at 610 psig, but the ultimate designed production rate will require a lean oil pressure of 810 psig. The additional head will be developed by operating the pumps at increased speed. Perfect radial balance at both conditions of operation is assured by the multiple-volute fluid passage design of these HMTA pumps.

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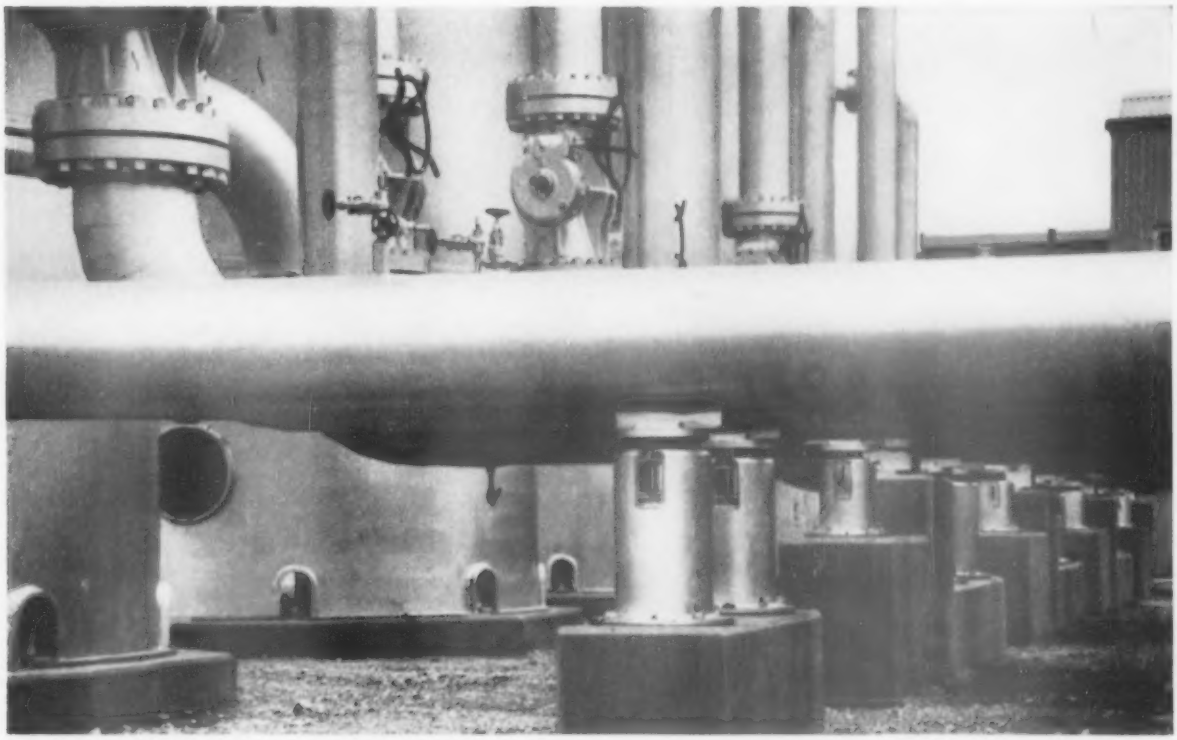

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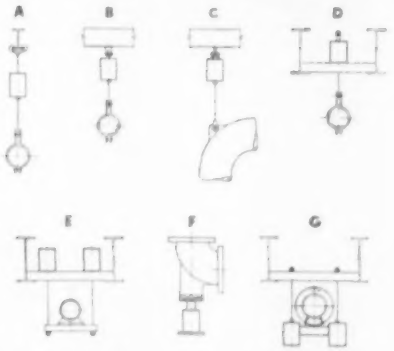


(Type A) Rod threaded to top cap (Type B) Furnished with single lug (Type C) Two lug style (Type D) Top adjusting (Type E) Adjustable top and bottom (Type F) For base support (Type G) Trapeze assembly.

The Grinnell Pre-Engineered Spring Hanger was developed after years of experience in analyzing the problems of flexible pipe suspension systems. It is *pre-engineered* to minimize changes in supporting force over total range of movement. Consider these outstanding features:

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- **18 sizes available from stock for load ranges from 53 lbs. to 12,000 lbs.**
- **Available in 3 spring lengths for travel ranges of 1¼, 2½, and 5 inches.**
- **Installation is simplified by integral load scale and travel indicators.**

*Precompression is a patented feature.

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*with*

*Revolutionary New Features!*

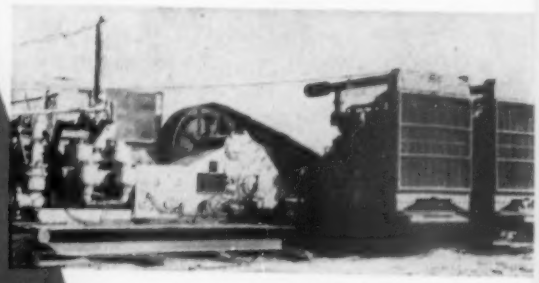

Photo of Wilson Pump on location. Note size in comparison to the engines. This pump is compact in design and construction, with the capability of handling high volumes, pressures and HP capacity.

MAXIMUM LINER BORE AND STROKE 7½" x 14", WITH SPEEDS OF 80 TO 90 STROKES PER MINUTE

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NEW TYPE CRANK CONSTRUCTION. HIGHER EFFICIENCY, AND LIGHTER THAN ECCENTRIC

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MARVELOUS NEW SUCTION FLOW EQUALIZER

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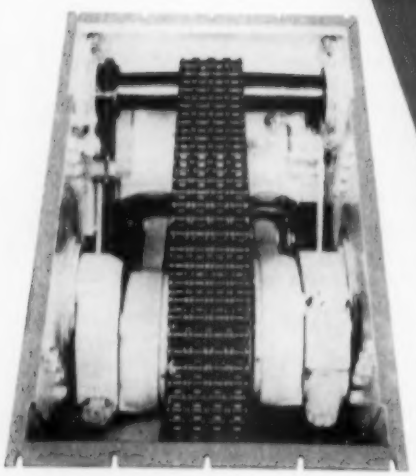

Wilson Revolutionary Chain Drive means no gears. This adds greatly to the efficiency and is proof against damage which was previously caused by gear teeth breakage.

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**WILSON MANUFACTURING CO., INC.**

The Home of RED IRON

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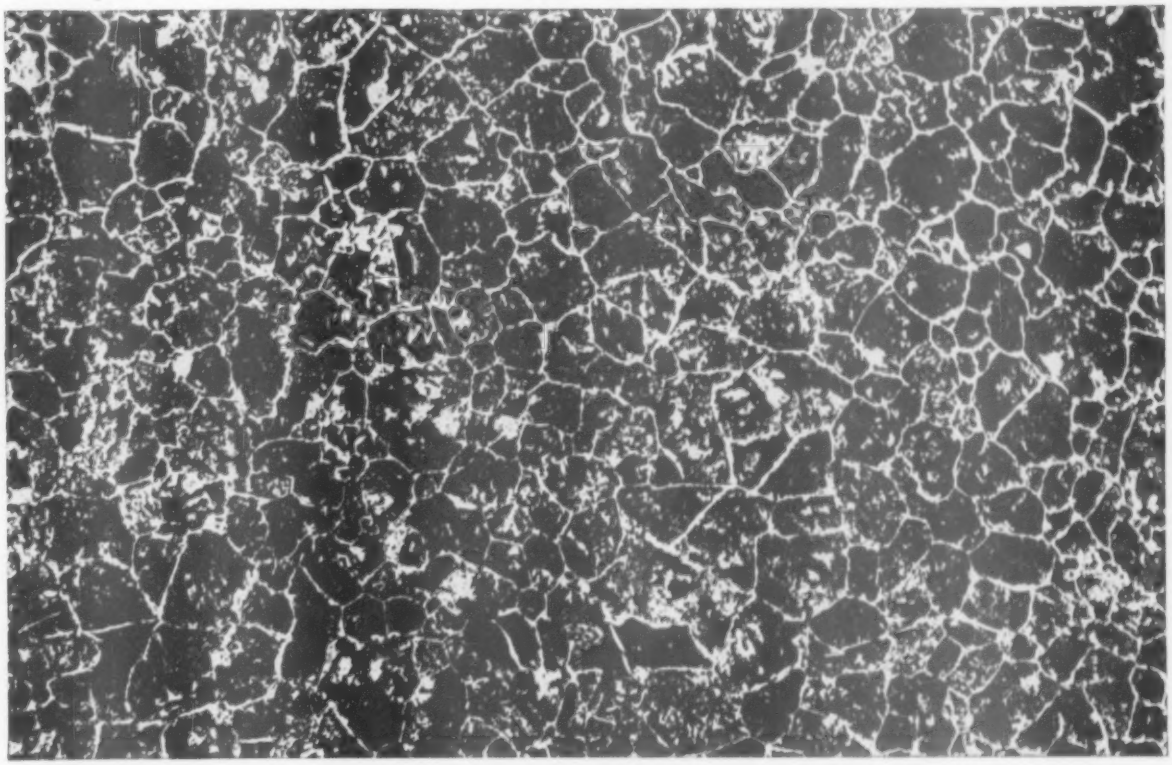


# See for yourself why TIMKEN® forging steels give you uniform, high quality forgings

NOTE the uniform grain size in this photomicrograph of Timken® forging steel. We examine every heat of Timken forging steel—spectrographically to assure uniform grain size. As a result, you can be sure that forgings made from Timken forging steels will give you uniformly high ductility and resistance to impact.

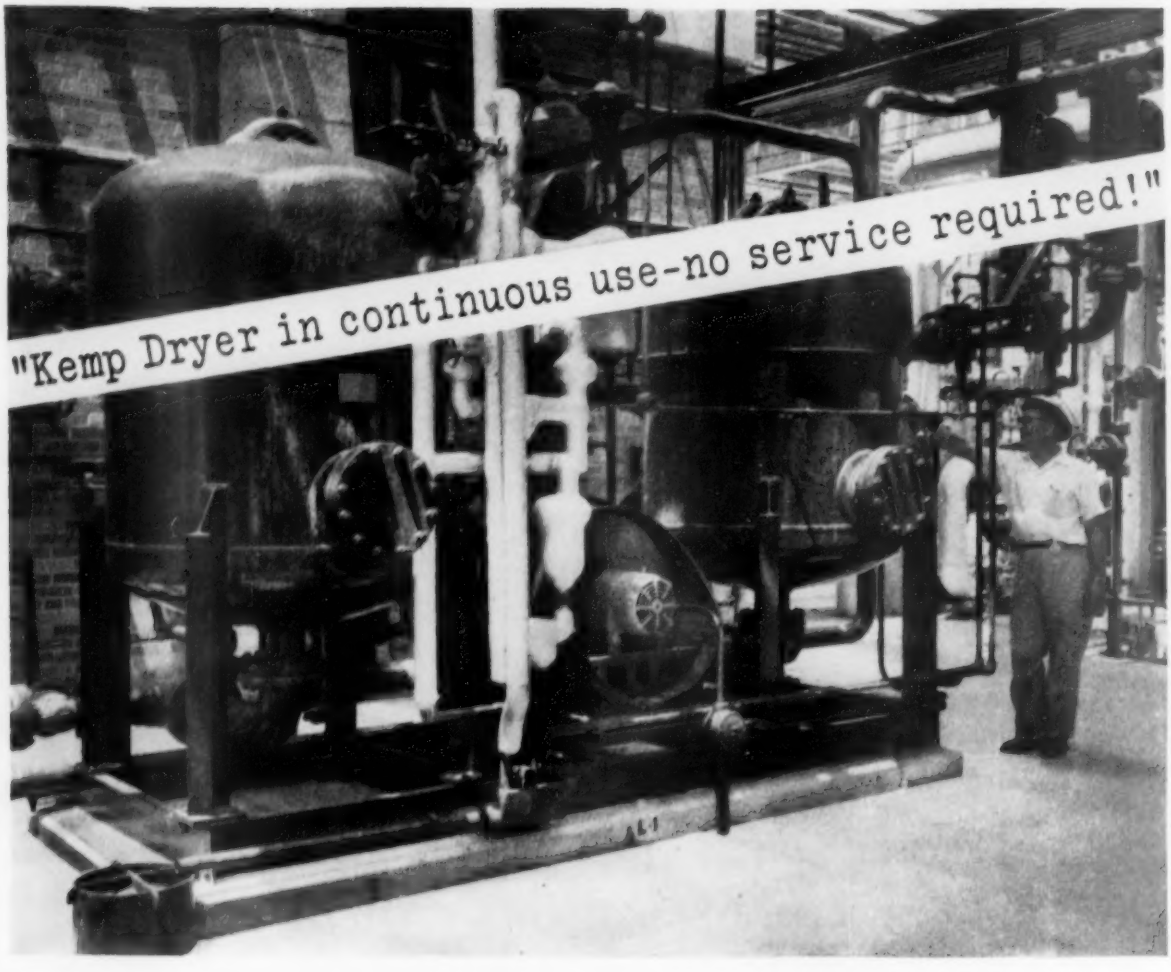
Because your order of Timken forging steel is handled individually in our mill we are able to target our conditioning procedure to your particular forging requirements. That minimizes your rejects.

Every lot of Timken forging steel responds uniformly to heat treatment because every lot has the same physical and chemical properties. For example, we rigidly control chemistry with the help of a direct-reading spectrometer which tells us the exact composition in 40 seconds . . . while the steel is still molten.

To top it off, Timken steel forging bars *save* you steel because their good dimensional tolerances produce uniform weight multiples with a minimum of steel lost in flashings. Get all these results in your forgings. Specify Timken forging steels. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING




## Cities Service Petroleum reports:

## *Kemp Dryer in continuous operation 7 days a week; has required no service or downtime!*

To dry compressed air for instruments in a hydroformer unit at its refinery in Lake Charles, Louisiana, Cities Service Refining Corporation has installed a Kemp Model LC SE2 Air Dryer. Since January, 1955, it has served continuously—seven days a week—drying 1900 cubic feet of air per minute to a dew point of −10° F.

This fully automatic Kemp Dryer, reactivated every 12 hours (or 22,800 cubic feet of air), has so far required no down-time or service at all! And, according to Mr. Glendon L. Smith, Unit Engineer at Cities Service, there is practically no pressure drop from the entering pressure of 285 pounds . . . further indication of Kemp quality and efficiency.

### Kemp Dryers for Every Purpose

Kemp offers a variety of dryer models to meet all problems. Designed to dry air, gases or liquids to sub-zero dew points at low cost, they are constructed of quality materials and embody the engineering knowledge gained from Kemp's many years of experience. They are available with manual, semi-automatic or fully automatic tower reactivation. In addition, Kemp will prescribe the proper desiccant for each specific drying job. If you have a problem involving the removal of water from air, gases or liquids, contact Kemp now. For complete facts and technical information, write for Bulletin No. D-100.

**KEMP**
**OF BALTIMORE**

**DYNAMIC DRYERS**

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • INERT GAS GENERATORS
SINGEING EQUIPMENT

**THE C. M. KEMP MFG. CO.**
405 East Oliver Street, Baltimore 2, Maryland

# Built . . . and packaged

# . . . for the toughest jobs!

## LINK-BELT API chain (SS type) is the most widely used in the field

NOT only is Link-Belt API Chain (SS type) manufactured for long, trouble-free service . . . it's packaged to go into use "brand new" despite the length of storage.

Link-Belt puts its chain in not one box, but *two*. The dustproof fibre carton and liner have no exposed seams —even the finest sand can't get in. And wet weather doesn't bother this durable, steel-banded package.

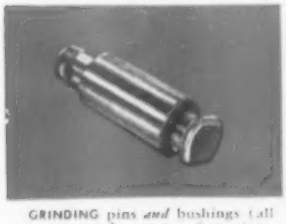
The care used in packaging Link-Belt API Chain is typical of the added refinements used in its manufacture. Four of these engineering extras are shown below. For the complete story, get Book 2580 on Link-Belt oil field equipment. And for prompt, expert service, call your nearest Link-Belt office or any leading supply store in your field.

**LINK-BELT**

**CHAINS AND SPROCKETS**

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields. 13,046

## Four of many 'EXTRAS' you get as standard on LINK-BELT API chain



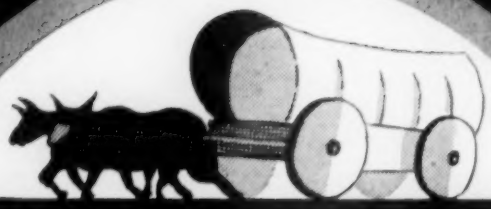
**GRINDING** pins *and* bushings (all contact surfaces) to a fine micro-inch finish eliminates wear-producing surface irregularities.

**SHOT-PEENED** rollers have been hammered by tiny steel balls—creating added ability to withstand shock and impact.

**COTTERS** have patented grooved shank affording tight fit in pin hole. Yet pin is easily removed or inserted. Cadmium plated.

**CADMIUM PLATING OF PINS** prevents rust, avoids corrosion fatigue no matter how long pins have been stored.

# PATENT CHEMICALS, INCORPORATED



## MANUFACTURERS OF DYES AND CHEMICALS FOR THE PETROLEUM INDUSTRY

***Your dependable source for...***

***Fluorescent colors and blooming agents used with additive compounded, solvent extracted lube oils***
***Dyes for gasolines, greases, waxes and industrial products***
***Petrol Ero Blue for Aviation gasoline***

This material meets Mil-F-5572 Specification

*Manufacturers* of fluorescent indicator for F.I.A. absorption method hydrocarbon analysis. 'Petrol' Red AB4, a specially developed red dye for gasoline marking to meet Mil-F-5572 specifications. 'Petrol' colors for gasoline, kerosine, Diesel and tractor fuels. • 'Greasol' colors for greases. • 'Stero' colors for waxes.

Patent Chemical Company specializes in petroleum problems and preparation of particular products to meet special requirements involving dyes; fluorescent colors; additives; blooming, wetting, dispersion agents, etc.

***SPECIAL PRODUCTS—***

**Fuel Oil Additives**
**Turbine Oil Additives**
**Petrol Blue Whiteners**
**Deblooming Agents**
**Gasoline Additives**
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**PATENT CHEMICALS INC.**
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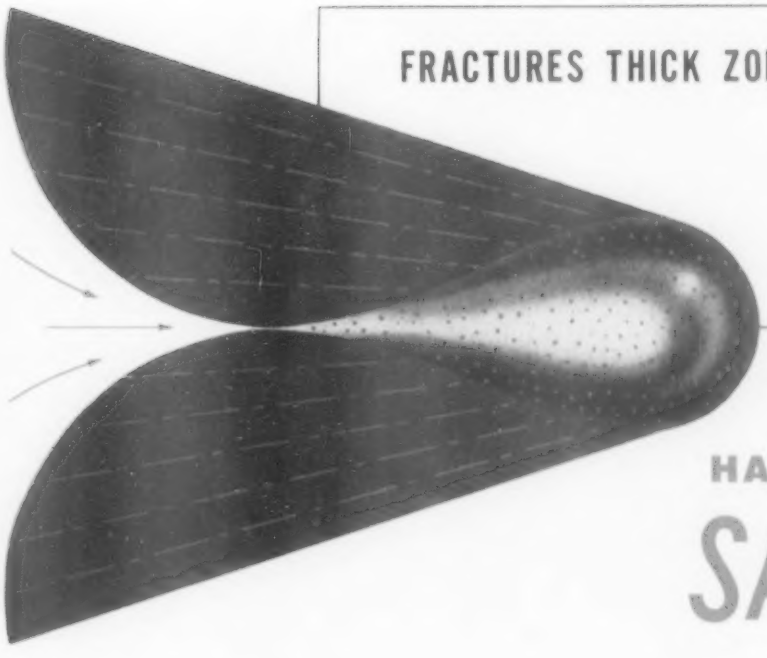


# FRACTURES THICK ZONES WITH ECONOMICAL VOLUME TREATMENT

## HALLIBURTON'S SANDOIL

Production in thick zones can be boosted most economically with large volume treatments of Halliburton's Sandoil. Successful fracturing jobs involving up to 100,000 gallons of fluid and propping agent are today increasing effective permeability within practical cost limits.

Sandoil is a true fluid composed of either lease crudes or refinery cuts and blends and a propping agent. Low fluid loss additives can be added if required by well conditions. Its sand carrying characteristics will vary with the viscosity of the oil used and the pumping rate but can be generally considered good—from 1 to 3 lbs. per gallon. Continuous proportioning at well site permits rigid control of sand ratios, and fast continuous pumps provide optimum, controlled injection rates. Sandoil has been primarily used in sand formations, but considerable success has been encountered in some dolomites and conglomerates.

COMPLETE FRACTURING SERVICES FOR ALL CONDITIONS

Nine different fracturing treatments are offered by Halliburton, each applicable under specific well conditions. Halliburton engineers have the experience of over 75,000 jobs to help you select and perform the most effective formation fracturing treatment for your well.

**HYDRAFRAC • ACIDFRAC • EMULSIFRAC • VIS-O-FRAC • SANDOIL**

**WATERFRAC • VERTIFRAC • MULTIFRAC • BIG FRAC**

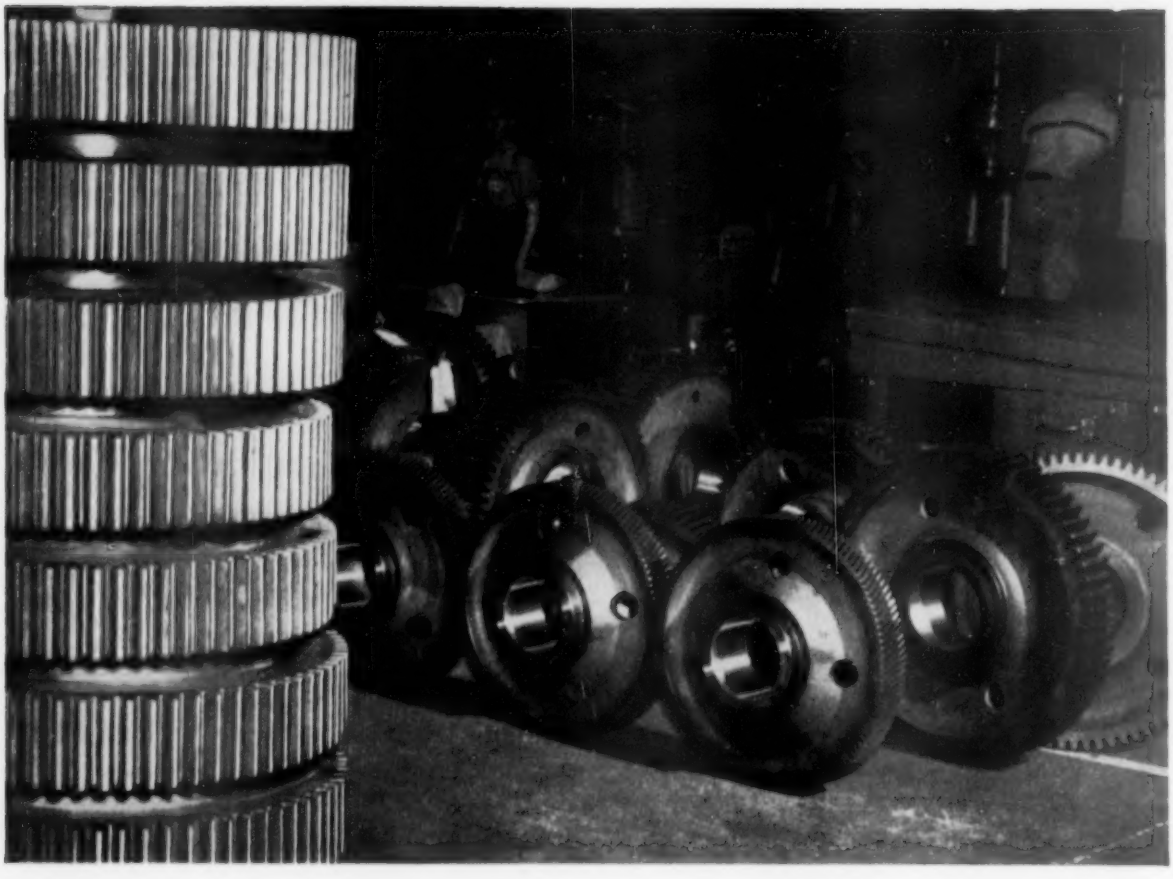
Open up large productive zones at the lowest possible cost with Halliburton's Sandoil. Call your local or district office of the Halliburton Oil Well Cementing Company.

COMPLETE DATA SENT ON REQUEST

*Get this valuable information for your Halliburton Service File*

# HALLIBURTON FRACTURING SERVICES

250 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG



# Good, Strong Gears Begin with Good, Strong Blanks

Because strength is usually the first requirement in a gear, Bethlehem devotes unusual care to the making of gear blanks. And equally important, Bethlehem has developed a process of manufacture that assures high strength *without* excessive weight.

This process is unique; there is nothing else like it. First, a heated round is placed in a special mill where it is upset, forged and rolled in a single operation. The resulting blank is dense, homogeneous, compact; the grain flow of the steel is smooth and uniform.

These characteristics go hand in hand with strength. Moreover, blanks made by this method are easy to machine, and fewer cuts are required in a good many cases.

When making gears—spur, bevel, miter, helical, and others—you can rely completely on Bethlehem blanks. But their use is not confined to gears alone. In fact, they're excellent for a long list of applications—crane wheels, industrial wheels, turbine rotors, clutch and brake drums, sheave wheels, flywheels, pipe flanges, tire molds, etc. The blanks are available in sizes from 10 to 42 in. OD, and can be furnished treated or untreated.

If you would like more complete information, write for a copy of Booklet 216. It will be sent to you promptly without cost or obligation.

BETHLEHEM STEEL COMPANY
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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

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BETHLEHEM STEEL

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Berg Exploration Co., Inc.
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SIE

**SOUTHWESTERN INDUSTRIAL ELECTRONICS CO.**

2831 Post Oak Rd. • P. O. Box 13058 • Houston, Texas

**GM DIESEL**
**CASE HISTORY No. ID2B-86**

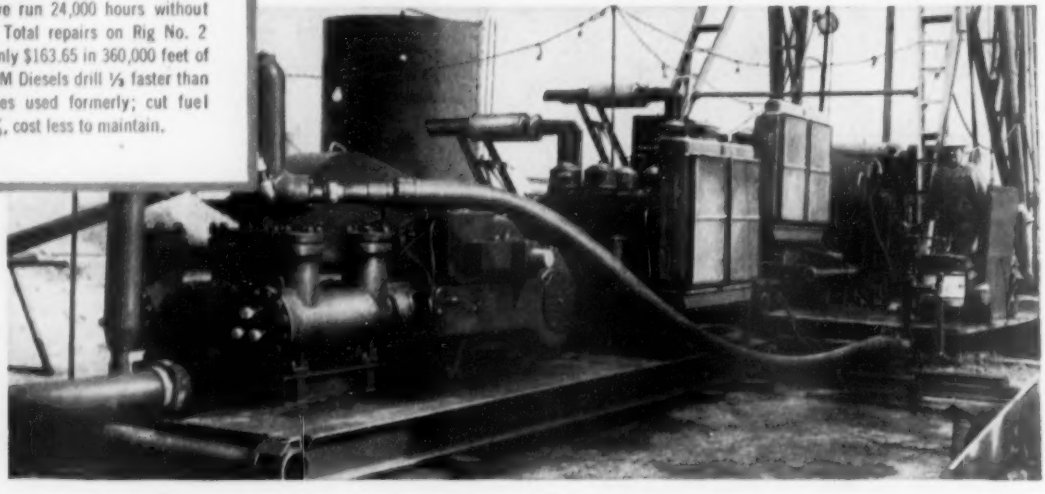
**OWNER:** Empire Drilling Company, Wichita, Kansas.

**INSTALLATION:** Two GM Twin "6-71's" drive National Supply draw works and Ideal mud pumps. Empire owns two rigs of this type.

**PERFORMANCE:** Engines on Rig No. 1 have run 24,000 hours without overhaul. Total repairs on Rig No. 2 came to only $163.65 in 360,000 feet of drilling. GM Diesels drill ⅓ faster than gas engines used formerly; cut fuel costs 33%, cost less to maintain.

# Drills ⅓ Faster, Cut Fuel Costs 33%

## Since he Switched from Gas to General Motors Diesel Power



Dan Kornfeld of Empire Drilling grew up on the end of a pipe wrench. He says, "You can't beat the performance of GM Diesels. I've got the extra power I need for jet bits and, with less weight per horsepower, I can move faster and easier."

You'll make hole faster with General Motors Diesels on your rig. These compact 2-cycle engines deliver power on every piston downstroke—accelerate faster, respond to throttle controls quicker.

And moves will be faster, easier and cheaper, too, because a GM Diesel packs more power in a smaller, lighter engine that's easy to load on trucks—fits road widths—requires no special road permits.

A GM Diesel is easy to service and maintain. There are no troublesome high-pressure fuel lines—simple unit injectors are almost as easy to change as a spark plug. It burns fewer gallons of regular Diesel fuel that's available no matter where you're drilling.

These engines are backed by a widespread distributor organization that supplies fast service and quick parts delivery day or night. Call your GM Diesel distributor or supply house for more information on GM Diesel power or write direct for full details.

**It Pays to Standardize on**

GM GENERAL MOTORS DIESEL POWER

**DETROIT DIESEL ENGINE DIVISION**

GENERAL MOTORS • DETROIT 28, MICHIGAN

**Single Engines . . . 30 to 300 H. P.** **Multiple Units . . . Up to 893 H. P.**

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**IN CANADA**—Distributors in all key locations, under
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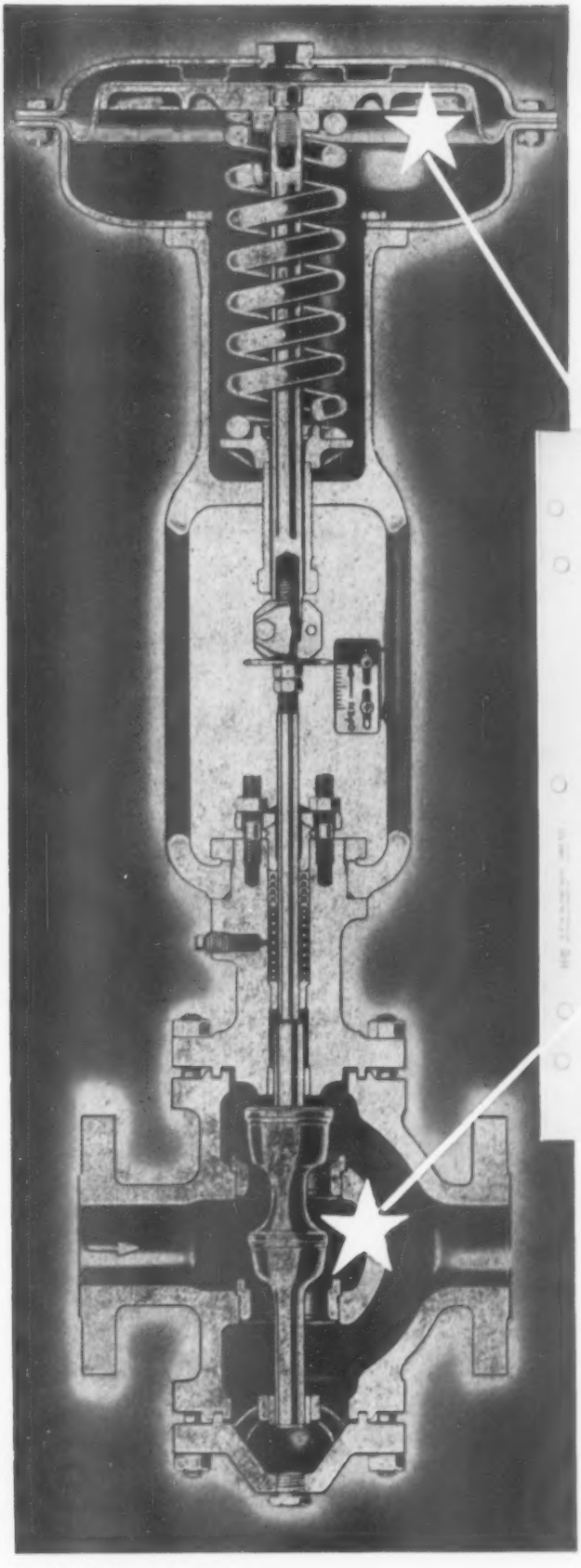
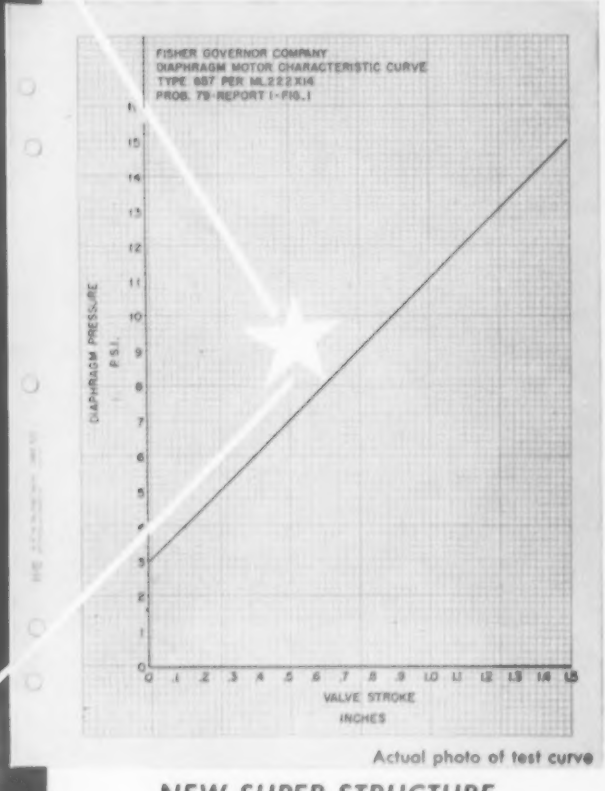
London, Ontario



FISHER®

*Improved Design*

# DIAPHRAGM MOTOR VALVES




Actual photo of test curve

## *NEW SUPER STRUCTURE PROVIDES LINEARITY OF OPERATION*

Special molded diaphragm, in combination with deep casing, provides constant diaphragm effective area. Resultant linear relationship between input signal and inner valve position makes *flow versus diaphragm pressure* characteristic of control valve identical to *flow versus lift* characteristic.

**FISHER GOVERNOR COMPANY**
**MARSHALLTOWN, IOWA**
Woodstock, Ontario

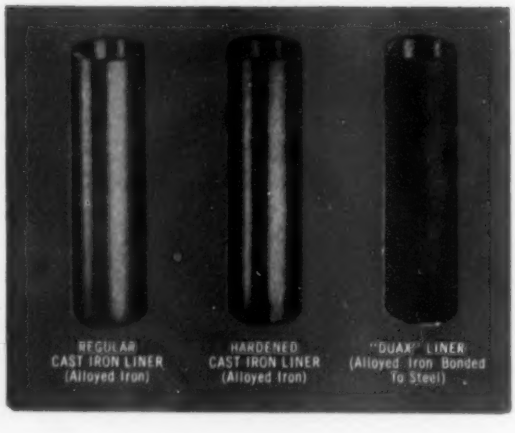
FISHER
*Our 75th* ANNIVERSARY

## This is trouble...

This liner (unretouched photo) was taken from a pump operating in a Mid-Continent oil field. Note how the effect of impact and corrosion has caused splitting and channeling. Cause of this breakdown might well be the operator's choice of a pump liner not designed to meet the conditions existing in the well.

## This is trouble-free...

*Here's why* ... Each of the three Axelson pump liners is designed metallurgically and produced through special manufacturing processes to answer *specific* well conditions. Axelson is the only pump manufacturer operating *its own foundry*, thus establishing complete liner quality control from the beginning. If you have a problem involving abrasion, heavy impact or corrosion, check with your Axelson man for a correct specification.




***To be SURE, call an Axelson field expert***

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*Pump Liners*

Send for Liner Bulletin

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# Temperatures Change – Readings Don't

Temperatures may jump or drop but the Cameron Mechanical Weight Indicator continues to show accurate weight—and in pounds not points. Since there is no hydraulic system there is no possibility of breakdown due to leakage of high pressure fluids.

The large yellow dial of the Type "C" with bold contrasting black and red numerals (determined by test to be the most legible colors) makes the indicator easily visible from any point on the rig floor.

The amazing accuracy of the Cameron Indicator assists the operator in maintaining the proper weight on bit during drilling operations—essential for cutting, fishing, packer setting or any bottom hole operation requiring precise control of weight. The case of the Cameron Weight Indicator is oil filled (like the Cameron Pressure Gauge) to provide a viscous damping of dial motion and to prevent damage from vibration.

A convenient exchange plan eliminates field repairs and assures fast economical service.

Cameron

**IRON WORKS, INC.**

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Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., Time & Life Bldg., New Bond Street, London W. 1 England.

THIS IS CAMERON'S 35th YEAR OF SERVICE TO THE INDUSTRY

# GOOD HOSE
## IN A HURRY

*ORDER THESE BRANDS*

**Champion Reprene Rotary Drilling Hose**

**Champion Reprene Vibrator Hose**

**Champion Mud Pump or Slush Pit Suction Hose**

**also**

**Champion or Republic Dock-Loading Hose**

**Oil Suction and Discharge Hose**

**Fuel Oil Hose**

**Tank Unloading Hose**

**Gasoline Pump Hose**

**LPG Hose**

**Wiretex Steam Hose**

Need Drilling Hose or Mud Pump Hose or other hose in a hurry? There are many stocks of quality Republic hose throughout the oil fields. Whatever you need in hose, belting or other rubber products, call one of these sources.

### MID-CONTINENT

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Supply Division, Tulsa, Oklahoma
or the J & L store near you.

### WEST COAST

Hendrie Belting & Rubber Company
Los Angeles, California

Pacific Coast Rubber Company
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Republic manufactures many kinds of Hose, Conveyor, Elevator and Transmission Belting and other industrial rubber products. All grades of Republic Champion Rotary Drilling Hose have nipples built in between the metal reinforcements of the hose carcass . . . the higher the pressure, the tighter the seal.

Stocked in the Mid-Continent Area by JONES & LAUGHLIN STEEL CORPORATION, Supply Division P.O. Drawer 2481, Tulsa 2, Okla. and the J & L Store in YOUR field.

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*TUBE-TURN 42" Elbow*

*Installing a TUBE-TURN odd angle elbow*

*TUBE-TURN 36" Tees*

# TUBE-TURN®

*Installing new TUBE-TURN Full Encirclement Saddle for a "hot tap".*

## PIPE LINE FITTINGS and FLANGES

## *available from stock!*

*Elbows*...45°, 90° and odd angles with tangents. *Tees* . . . straight and reducing outlet with or without scraper bars. *Venturi reducers* . . . *Full encirclement saddles* for hot tap . . . Every type and size of fitting and flange for pipe line requirements are available from Tube Turns . . . most of the items *from stock!*

"®" and "TUBE-TURN" Reg. U. S. Pat. Off.

*TUBE-TURN Welding Fittings and Flanges are made in U.S.A. They meet all U.S. piping code specifications*

**TUBE TURNS** LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

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†Exported through Mid-Continent Cummins Export Corp.
*An EXCLUSIVE Mid-Continent Supply Co. EXPORT Division Account

## FAMOUS BRAND NAMES FOR EXPORT INDUSTRY

Mid-Continent Supply Co. supplies the foreign oil industry with the same well-known, highly respected, field-proven products that are so widely used throughout the oil country in the United States . . . and, Mid-Continent's famed "Around the Clock — Around the World Service" applies to the export trade too! Tested, proved products . . . plus tested, proved service and supply, gives you the best oil field service obtainable — in both domestic and foreign fields.

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**MID-CONTINENT**
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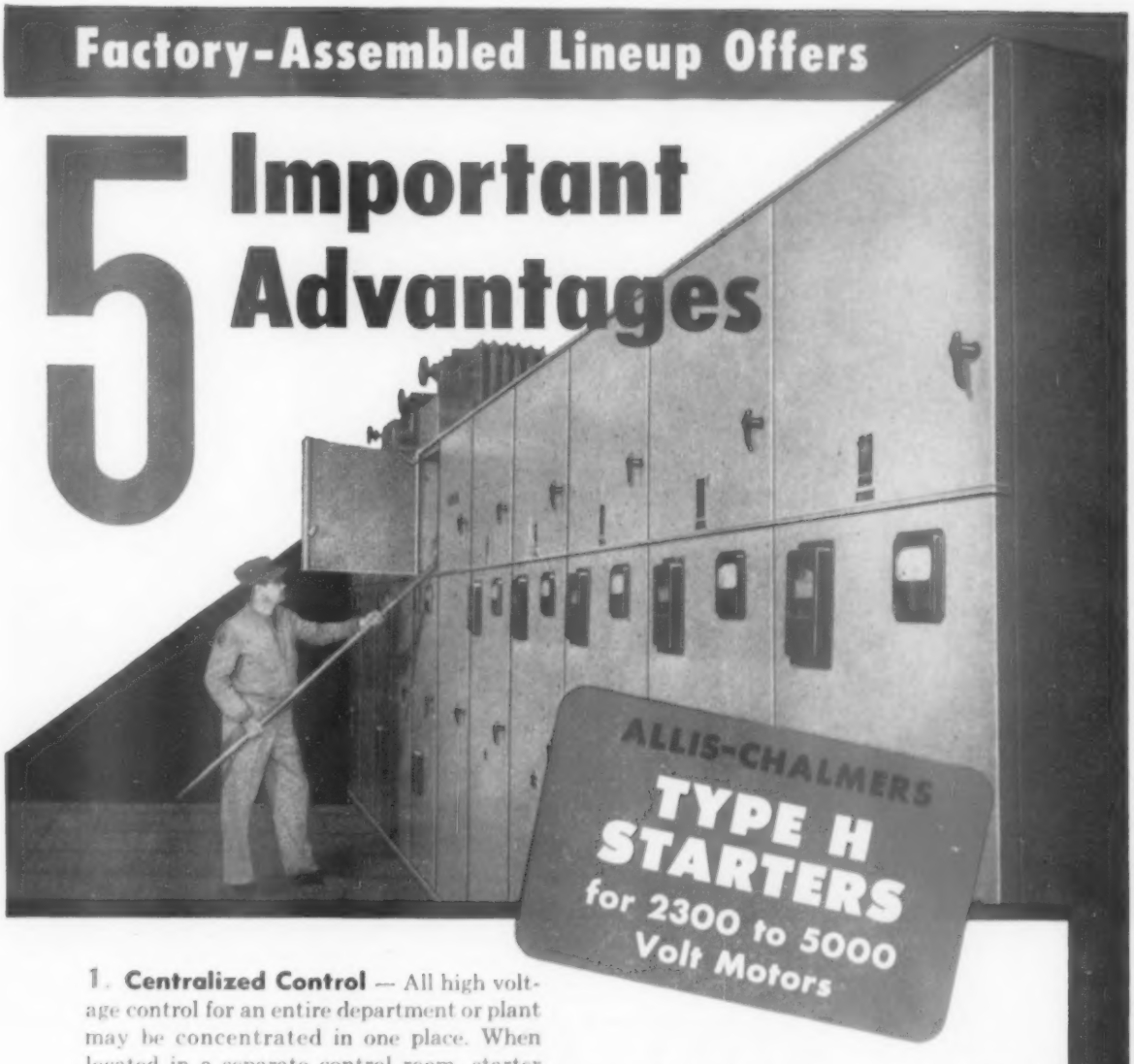
*THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY*

## Factory-Assembled Lineup Offers

# 5 Important Advantages




1. **Centralized Control** — All high voltage control for an entire department or plant may be concentrated in one place. When located in a separate control room, starter lineup operates in cleaner atmospheres. It also may be made inaccessible to unauthorized personnel.

2. **Low-Cost Installation** — Control group is factory-assembled *and bussed*. Conduit layout is greatly simplified. For example, lineup requires only one incoming power feeder.

3. **Simplified Expansion** — Internal bus and convenient wiring provision plus standardization of cubicle size facilitate addition of starters. Each starter unit is self-contained. Expanding the lineup is merely a matter of adding a starter and connecting the bus.

4. **Attractive Appearance** — Uniformity of cubicles presents a modern, streamlined appearance.

5. **One-Company Responsibility** Complete responsibility for assembling proper control devices and for control performance rests with Allis-Chalmers. A-4704

*For complete information, see your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.*

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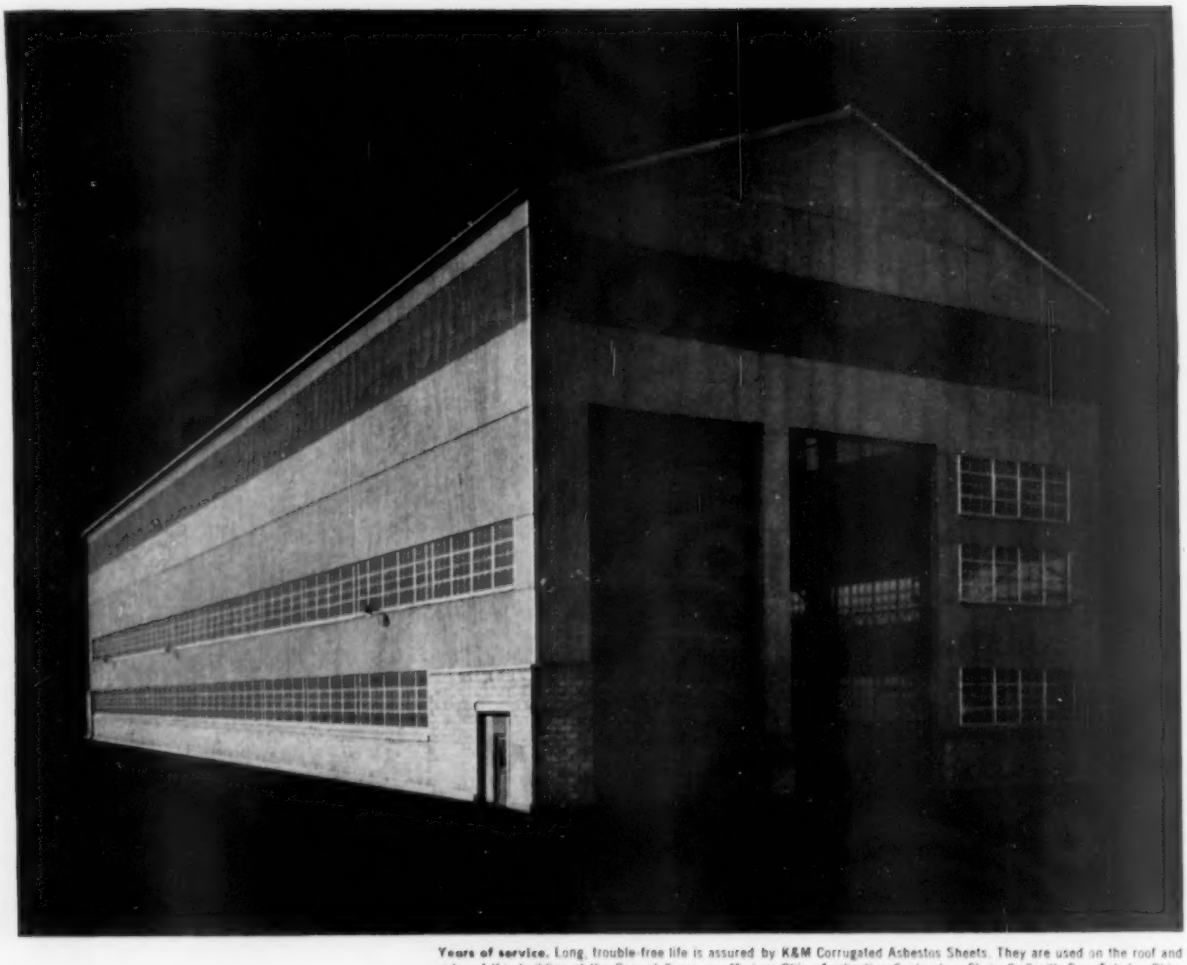

**Years of service.** Long, trouble-free life is assured by K&M Corrugated Asbestos Sheets. They are used on the roof and sides of this building at the Osgood Company, Marion, Ohio. Application Contractor: Elwin G. Smith Co., Toledo, Ohio.

# CUT MAINTENANCE COSTS

## with K&M Corrugated Asbestos Roofing and Siding

When K&M Corrugated Asbestos Sheets go up, upkeep expenses stay down. They never need protective painting, require little or no maintenance.

**Really rugged.** These sheets are strong, dense, and tough. Made of asbestos fiber and portland cement, they won't burn, rot, or corrode. And they're highly resistant to extremes in weather.

**Big savings.** These corrugated sheets make possible low application costs—they need only a minimum of cutting or fitting. And they offer the extra money-saving feature of needing little or no upkeep.

**Send for details.** At your request, we'll gladly send complete data on K&M Corrugated Asbestos-Cement Sheets. Write today.

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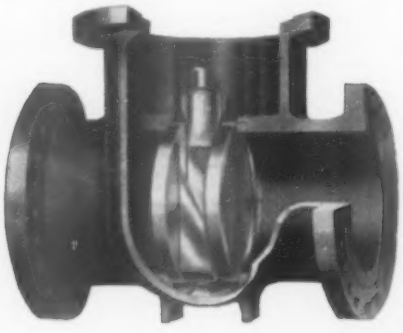
K&M best in asbestos®

*Cutaway showing extreme simplicity of Darling's unique fully revolving double disc parallel seat gate valve principle.*



# TROUBLE-FREE SERVICE

## because it's a DARLING cast steel pipe line gate valve

*Darling 20" motor-operated series 600 gate valve of the revolving disc type on a major oil line.*

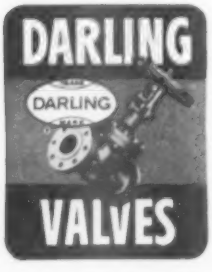
LET'S go on record that there's probably no other pipe line valve that can match a Darling gate valve in *avoiding* the most common operating troubles. Darling users have been finding this out on all their cross-country lines.

Back of it is Darling's *fully revolving double disc parallel seat principle.* This results in automatic compensation for valve body distortion, uniform distribution of disc and seat wear, and positive closing. And, naturally, these things add up to longer valve life *with the lowest maintenance and least trouble.*

If you're not already using Darling Pipe Line Gate Valves, it will pay you to take a few minutes to get fully acquainted with the unique Darling double revolving disc principle and its many advantages.

### SEND FOR DATA

Darling Parallel Seat Gate Valves come in a wide range of sizes and types for all gas and oil line requirements. Simply outline your particular service needs or ask for a complete descriptive bulletin.




**DARLING VALVE & MANUFACTURING CO.**
**Williamsport 1, Pa.**

*Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ont.*

**FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN**

# Catalysts

## Require stability, too . . .

and with Davison's *LOW DENSITY* catalyst you get commercially proven higher stability. You get a higher degree of thermal stability without affecting the resistance to attrition or other proven qualities of Davison catalysts. Commercial fluid cracking units, operating for over one year, demonstrate that this stability leads to:

**Higher surface area—Higher pore volume—Higher pore diameter—Higher catalytic activity—Improved regeneration**

This new *LOW DENSITY* catalyst is yet another Davison catalyst manufactured with controlled catalyst characteristics. At Davison you can get the catalyst best suited for your unit. For information on Davison's new *LOW DENSITY* catalyst, as well as other Davison catalysts, see your Davison representative or write.

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**DAVISON CHEMICAL COMPANY**

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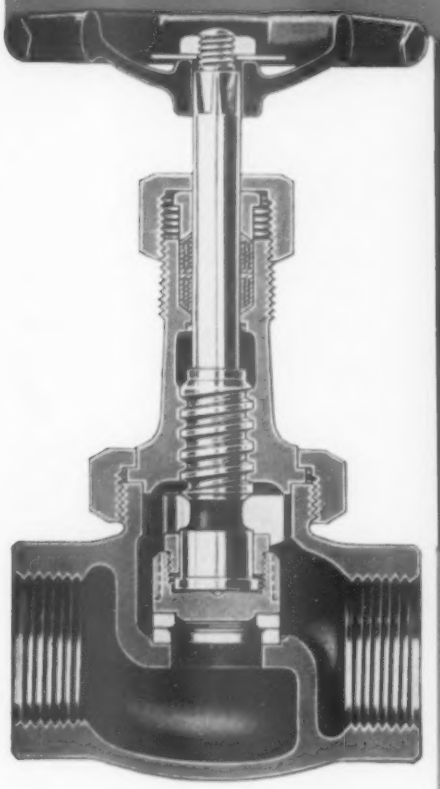
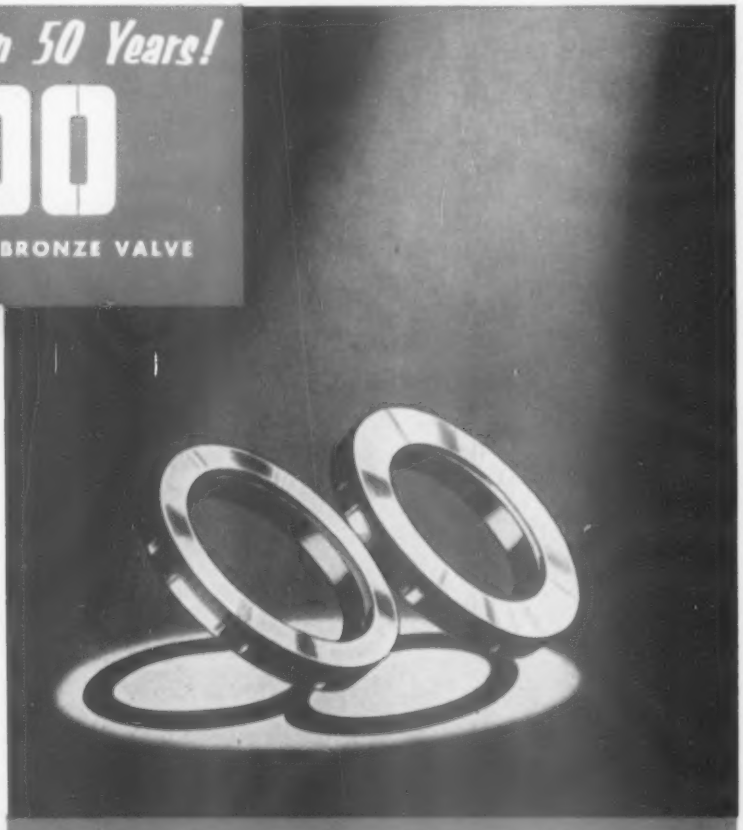
# *Biggest Valve News in 50 Years!*

# LQ600

THE REVOLUTIONARY NEW BRONZE VALVE





# BRINALLOY*

## SEATS and DISCS

**HERE'S THE BIGGEST BRONZE VALVE NEWS IN HALF A CENTURY**—made possible by Brinalloy, a new patented seating alloy developed in the Lunkenheimer Metallurgical Research Laboratories. Seats and discs of this new alloy are far more resistant to wear and corrosion than 500 Brinell Stainless Steel — they even outwear case-hardened Stainless Steel exceeding 1000 Brinell! In the most severe tests, there was no need for renewability, repair, or replacement.

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***NOW*** you can beat the high cost of valve maintenance and replacement with the first completely revolutionary bronze valve in 50 years! No matter how severe the throttling service, in 4-year tests, there was no leakage, erosion, or wire drawing. This new valve pays cash dividends in maintenance savings — *year after year after year!* For more information, call your Lunkenheimer Distributor or write The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.

* *Patented Alloy*

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# LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

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# GOING PLACES *on the great turnpikes with Cities Service...*

Driving along the major turnpikes, as millions did last year, it is easy to see that Cities Service has more stations on principal toll highways than any other oil company. During 1954, motorized Americans bought more Cities Service petroleum products than ever before.

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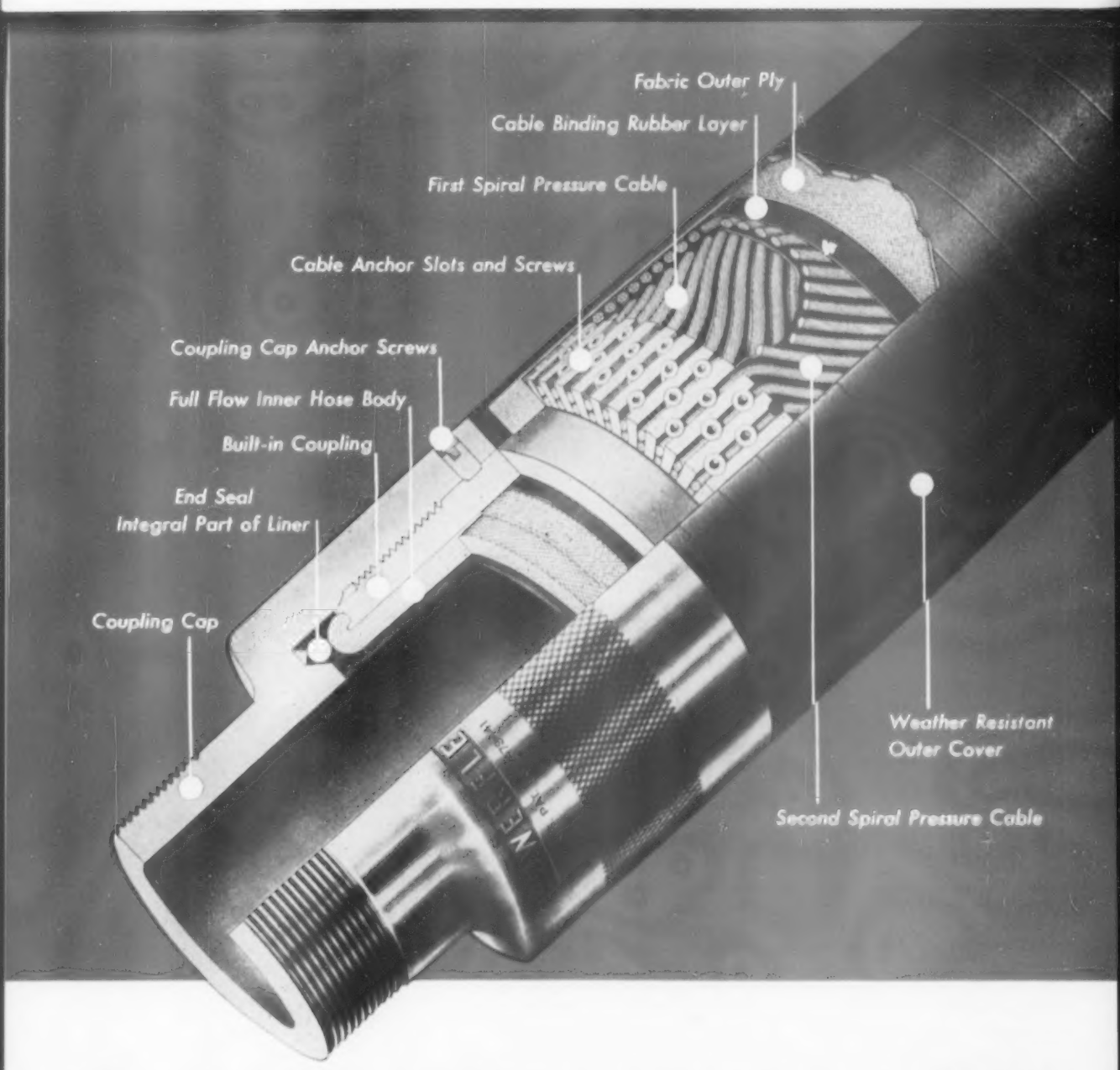


# Thermoid Powerflex Rotary Hose is built to go "all the way" in deep hole drilling!

***33 miles of high tensile steel wire*** forms the cable that is precision wrapped, counter wrapped and imbedded in every length of Powerflex. Oil and abrasion resistant Neoprene tube and cover are reinforced with impregnated multi-ply woven fabric.

***Patented Full-Flow couplings*** of forged steel are an integral part of the cable assembly . . . permanently secured *before* the hose is wrapped and cured. They positively cannot leak or pull off for the life of the hose.

***Powerflex is proof-tested to 5000 psi*** before shipment . . . will withstand the highest pressures. Order Powerflex from your nearest supply store or one of the following Thermoid Warehouses:

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Wire Line Turn Backs • No-Wip Line Savers • Stuffing Box Rings • All Types of Hose • Molded Specialties • Brake Blocks

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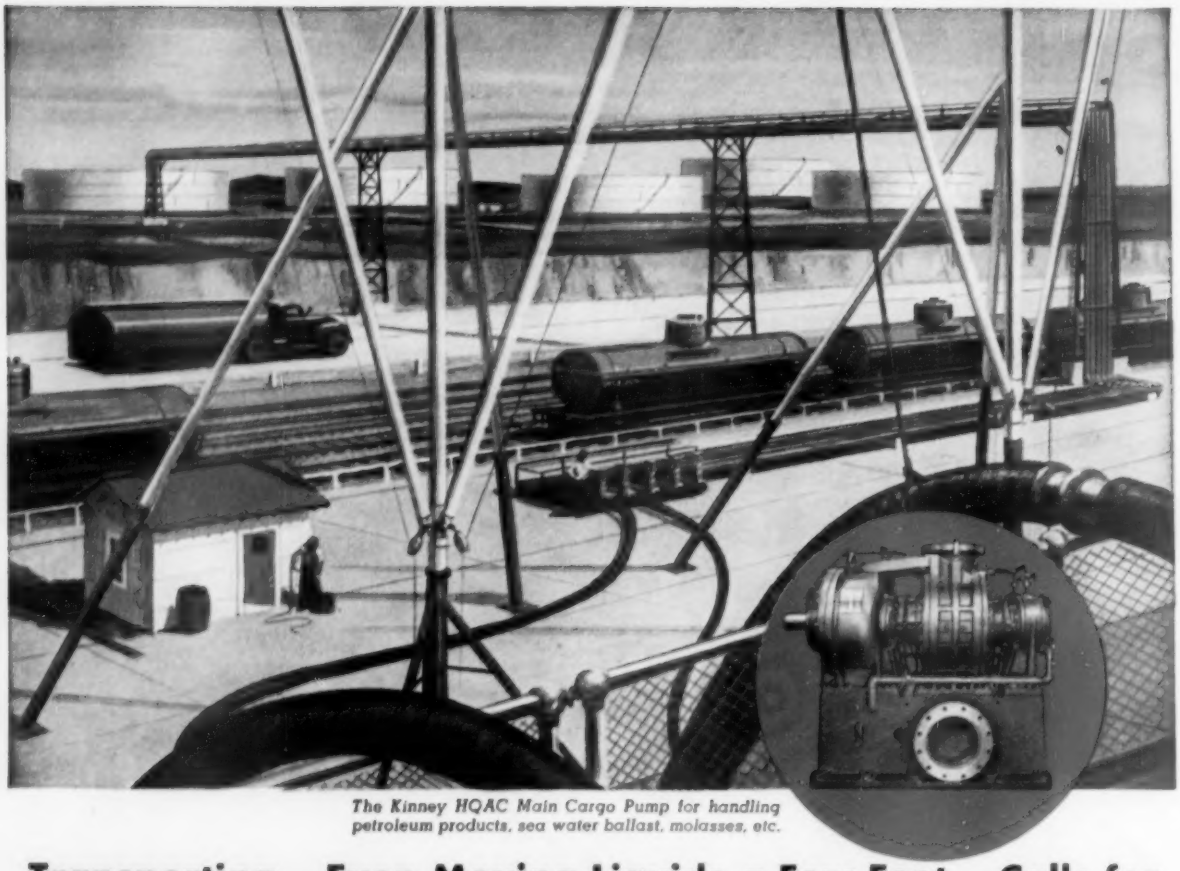

*The Kinney HQAC Main Cargo Pump for handling petroleum products, sea water ballast, molasses, etc.*

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**Liquid Handling Pumps, Centrifugals and deep well Turbines, 7000 gpm, 500 ft. heads. Turbine-type, 150 gpm, 600 ft. heads. Condensate Return Units.**

All of these jobs: *drawing a glass of water . . . transferring a tanker load of crude oil . . . transporting a carload of glucose or molasses . . . racking off barrels of beer . . . injecting metered additives into beauty lotions or chemical compounds . . .* all have one thing in common. YOU MUST HAVE A PUMP TO DO THEM — *ECONOMICALLY.*

Divisions of The New York Air Brake Company provide the Pumps to perform these and thousands of other functions. From alcohol or gasoline to heavy waxes, tars, and asphalt, there is a pump bearing the NY trademark to which you can confidently turn for a solution to your problem. It is no empty claim that "if it will flow through a pipe, these pumps will pump it."

The AURORA PUMP Division offers Centrifugal and Turbine-type Pumps for deep well, sump, irrigation, fire fighting, boiler feed, condensate return and household use. KINNEY Mfg. Division produces the famous KINNEY Rotating Plunger and Heliquad Gear Pumps that handle all sorts of difficult liquids and semi-solids.

And, too, there are the high pressure Hydraulic Pumps of the DUDCO, HYDRECO and WATERTOWN Divisions which furnish pressures to 5000 psi to develop Fluid Power for aircraft, machine tools, mobile and other industrial equipment. These Divisions also provide Hydraulic Motors, Valves and Cylinders to develop complete hydraulic circuits. Finally, to complete the pump story, there are KINNEY High Vacuum Pumps for the dependable evacuation of air or gases in electrical, electronic, vacuum distillation, refining, and processing industries.

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## Butyrate pipe is light

Tenite Butyrate pipe weighs only 1/12th as much as cement-lined metal pipe. One man can easily carry three 20-foot lengths of 4" Tenite pipe.

## Butyrate pipe is easy to join

Joining Tenite Butyrate pipe in the field is fast and easy. You just solvent weld slip-sleeve couplings to the pipe ends. Your only "tool" is a paint brush.

## Butyrate pipe resists corrosion

Buried or exposed to the weather, Tenite Butyrate pipe eases corrosion problems because it resists salt water, sour crudes and electrolytic soils.

# Could these advantages of Tenite Butyrate help you?

**REMEMBER WHEN** corrosion and paraffin clogging were two inescapable problems for pipe lines? They're not today, though. Oil men have found that pipe made of Tenite Butyrate resists all the corrosion encountered in oil fields. And in high-paraffin crude lines where metal pipe would have to be cleaned more than once a week, Tenite Butyrate pipe remains clear with few, if any, shutdowns necessary.

Tenite Butyrate pipe offers many advantages over metal pipe and has proved itself in all types of fields for several years. Today, the question no longer is, *"Will Butyrate pipe do the job?"* but rather, *"When will you give Butyrate a chance to do the job?"*

For further information and technical help in adapting long-lasting Tenite Butyrate pipe to your operations, write: EASTMAN CHEMICAL PRODUCTS, INC., Kingsport, Tennessee, subsidiary of Eastman Kodak Company.

# TENITE
## BUTYRATE
*an Eastman plastic*

**EASTMAN CHEMICAL PRODUCTS, INC.**

KINGSPORT, TENNESSEE

Please send me information on TENITE BUTYRATE PIPE and a list of companies manufacturing Tenite pipe and fittings.

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POSITION

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CITY STATE

OG12-55

# Dumping Couplings...

## *What They Are And What They Will Do*

**by Mel Woodward, District Manager**
**Twin Disc Clutch Co., Tulsa, Okla.**

Simply stated, a dumping coupling is a fluid coupling with provisions for cooling the fluid and for exhausting all of the fluid from the coupling in order to give it a positive disconnect.

It was required by the drilling industry for oil field service. The basic need was for cushioning—cushioning to prevent snap-stretching of chains, to ease the engagement of clutches, to reduce the side loading on bearings, to inhibit torsional fatigue in shafting, and to extend engine life.

**Shock loads are reduced** in a fluid coupling by dissipating them over a much greater period of time and with generally less than one-third the drive stress created by the engagement of a friction drive. High stresses which damage operating parts of a straight mechanical rig are the result of inertia. So, actually it is the inertia of the fluid within the coupling that provides a protective cushion that so greatly reduces damage to the rigs. This is proved by improved chain life—because clutches do not wear out or require frequent adjustments—because bearings and shafts do not fail even at depths far beyond those at which the rig is rated—and because engine life has been substantially increased.

Drilling men wrote the specifications for the dumping coupling, and now over 500 units later, it is well to point out how these basic specifications were met. The following is what was desired—and what was provided by the dumping coupling.

1. *Simplicity*—only two moving parts plus pump and fan. 2. *Serviceable*—Filter, fan, pump and valve accessible from outside. 3. *Inexpensively installed*—Simply bolts to flywheel housing and connects driven shaft, permitting easy field installation. 4. *Compact*—distance from engine flywheel housing to output shaft is approximately same as that of conventional friction power take-off. 5. *Long life*—Four years of attention-free operation indicate excellent service life. 6. *Easily operated and understood*—operation by more than 300 drilling crews indicates acceptance by oil industry. 7. *Not an additional unit*—disconnect feature enables it to replace clutch between engine and compound.

• • •

**If you are interested in more information—more proof—on how dumping couplings—Models 21 HUD-0 and 27 HUD-00—may be applied to your rigs, contact the Twin Disc District Office nearest you . . . Tulsa: Enterprise Building, Sixth and Boston, Gibson 7-1578. Dallas: 1511 Turtle Creek Boulevard, Riverside 3014. Los Angeles: 2950 Leonis Boulevard, Logan 8-3309. Twin Disc Clutch Company, Racine, Wisconsin.**

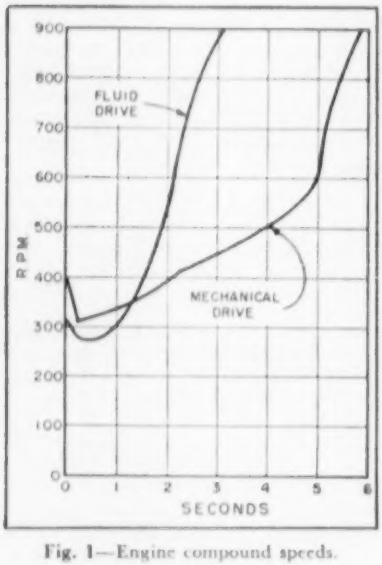



Fig. 1—Engine compound speeds.

Curves are from actual rig with couplings and from comparable rig with mechanical drive. Both were identically powered, working under equal conditions. Rig with fluid couplings accelerated load more rapidly than the other—this occurred between 300 and 600 rpm—above 600 rpm rate is approximately equal in both rigs.

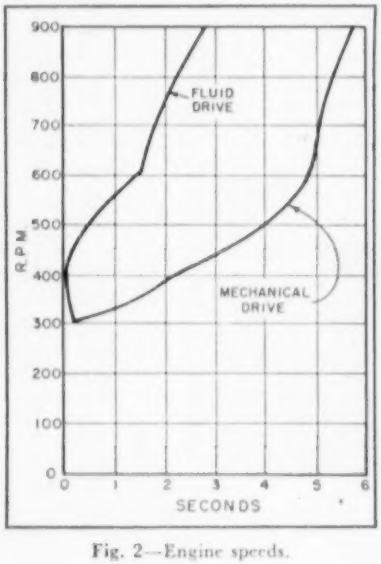



Fig. 2—Engine speeds.

This figure illustrates another performance bonus. The engine is pulled down 100 rpm in only ¼ second on mechanical drive, which is not only tough on the engine, but other shock loads are transmitted directly to the engine in the straight mechanical drive. The fluid coupling protects the engine against all of these.

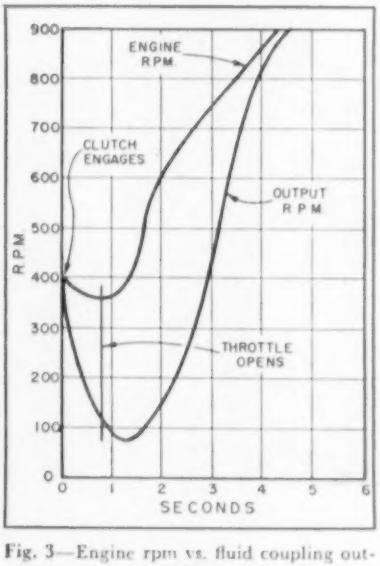
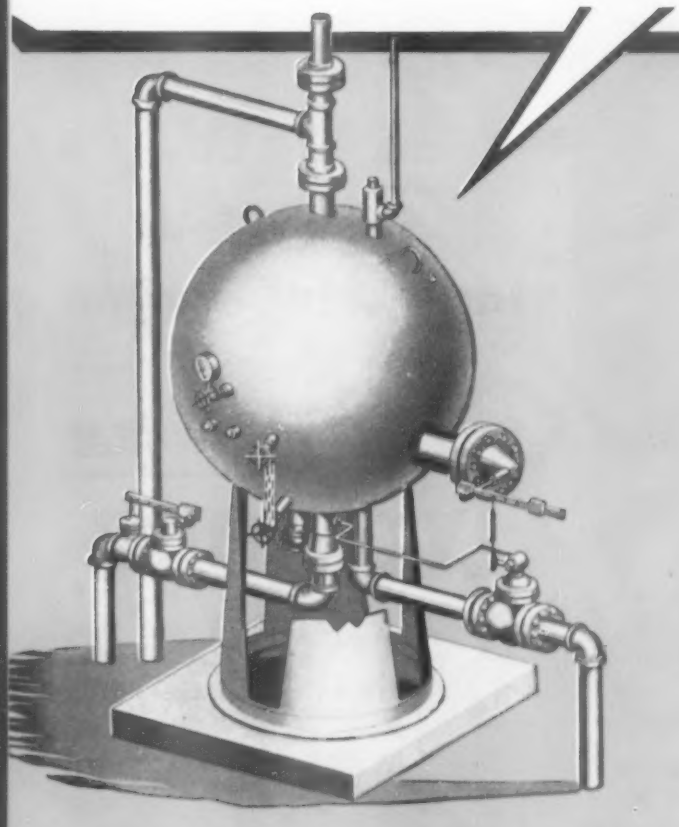



Fig. 3—Engine rpm vs. fluid coupling output rpm.

The clutches were dropped in at zero seconds, whereas the throttles were not opened until almost a second later. This caused a drop in compound speed to below 100 rpm, but created only a small drop in engine rpm. Yet as Fig. 1 shows, the compound came up to speed more quickly than on the straight mechanical drive.

(ADVERTISEMENT)

# Introducing The New BS&B Oil-Gas Spherical Separator



## It's The Model "OGS" With *Exclusive* Internal Design!

**BS&B's exclusive new Spherical Separator design takes full advantage of the spherical characteristics of the separator to provide maximum separation efficiency.**

**The inlet stream enters the top of the separator and passes through *three* separating stages as it flows downward through the vessel. Liquid is collected in the lower hemispherical head and is discharged by a liquid level controller through an outlet in the bottom of the vessel. Gas is also discharged out the bottom of the separator through a separate gas outlet pipe.**

### Type 30-26 (Low Pressure)

**WP: 125 and 230 psi.**
**Shell Diameters: 40", 41", 46", 54".**

### Type 30-27 (Intermediate Pressure)

**WP: 600 psi.**
**Shell Diameters: 24", 36", 42".**

### Type 30-28 (High Pressure)

**WP: 1200 and 2000 psi.**
**Shell Diameters: 24", 36", 42".**

### FEATURES

1. **Simple Hookup**
   Connections to top inlet and bottom outlets are easily made from any direction.
2. **Liquid Slugs**
   Internal design diverts liquid slugs rapidly to the liquid section.
3. **High Capacity**
   The large ratio of liquid surface area to volume in the liquid section allows rapid release of solution gas from the oil.
4. **Controls**
   All controls and valves are BS&B.
5. **Small Space Requirement**
   Compact design is a distinct advantage of the Model "OGS" over other separators.
6. **Servicing**
   Convenient access openings are provided to simplify periodic cleaning and blow-down.

For Full Details on the BS&B Model "OGS" Spherical Separator, Contact Your BS&B Representative, or Write to . . .

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**NOW**... out of 250 million hours of flight power experience comes

# a NEW air-cooled industrial engine the FULL POWER LYCOMING C2-90

**Rated 30 H.P.! Delivers 30 H.P.!**

## Specifically designed to solve oil industry problems

The C2-90 is built to the same high standards that have made Lycoming a top name in aircraft engines for over a quarter century. The C2-90 does just what we say it will do—work at full power under the most rugged conditions. So why buy an engine you have to de-rate (up to 50% for continual duty service)?

**Reserve Power**—C2-90's full-power rating provides ready reserve for everything from oil drilling machinery to pipeline equipment.

**Long Life**—C2-90 is ruggedly designed for thousands of hours of dependable service.

**Cooling Design**—C2-90 provides newly improved cooling surfaces to avoid overheating from dust conditions; a cooling fan that operates through entire speed range.

**All-Weather Performance**—C2-90 advanced air-cooled design delivers rated output in high temperatures or sub-zero.

**Imagine running your car for 80,000 continuous miles without service!** In Williamsport, Pa., the C2-90 was test-run at full load, full throttle for over 1,000 continuous miles with no service except for gas and oil. This is equivalent to running your auto 80 miles an hour for 1,000 hours non-stop, or 80,000 continuous miles *without service!*

LOOK TO

**For full details on the new Lycoming C2-90 write:**

**Sales Engineering, Industrial Engines, Lycoming, Williamsport, Pa.**

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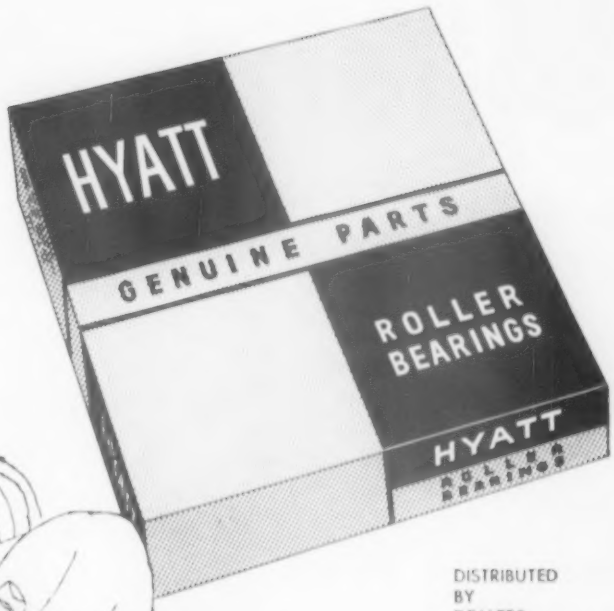
combine the scientific skills, and production facilities of 3 Avco divisions of Avco Manufacturing Corp. . . . Lycoming; Avco Advanced Development; Crosley—to produce power plants, electronics, air-frame components, and precision parts.

# NO WONDER HYATTS ARE SO GOOD . . .

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A UNITED MOTORS LINE

**there's no substitute for . . .**

## EACH ONE GETS OVER 50 GOIN'-OVERS!

### says HY WHEELER, the sage of the socket wrench

And that's just *before* assembly, brother! The average roller gets off "easy" with only 17 inspections—the average race has to pass 41. Then at *final* inspection, every finished Hyatt gets a goin'-over that makes the third degree look like a Sunday school picnic!

That final inspection and packaging at Hyatt is as careful as for a thousand-dollar watch. Why, the girls even have their hands coated with special stuff to keep any sweat from touchin' those precious Hyatts! That's why I keep remindin' you: There's other bearings that *look* as good, but you *hold out for Hyatts in the blue and yellow box.*

# HYATT ROLLER BEARINGS

STRAIGHT BARREL TAPER

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

# What's going on

UNDERGROUND, drill pipe and casing take a terrible beating.

Drill pipe is limber. Under torque it spirals as it rotates—suffers severe bending stress, fatigue, wobble, and twisting action.

Casing, in turn, is subjected to tremendous pressures and vibrations in deep wells. It *must* possess great joint strength and high collapse resistance.

National Seamless Drill Pipe and Casing can take this kind of punishment in stride . . . Ask the oil men!

National Seamless Oil Country Tubular Products are acknowledged the world over as the ideal material for deep well work, from the standpoint of both steel quality and method of manufacture. Piercing a steel billet to form a seamless tube is one of the most difficult forging operations in the steel industry. Only steel of the very best forging properties and of high uniformity can be used for the seamless process, since the piercing operation tends to search out any defects in the metal.

For dependable drill pipe, casing and tubing that can "take it"—material that will give you *more service per dollar invested*, remember to specify USS National Seamless . . . every time!

## Here are some of National Tube's contributions to the Oil and Gas Industry...

**National Deoxidized Bessemer Steel Casing and Tubing—Grades H-40, J-55**

Especially well-suited for oil production because of its combination of high yield strength and good ductility.

**National Warm-Worked Casing—Grade N-80**

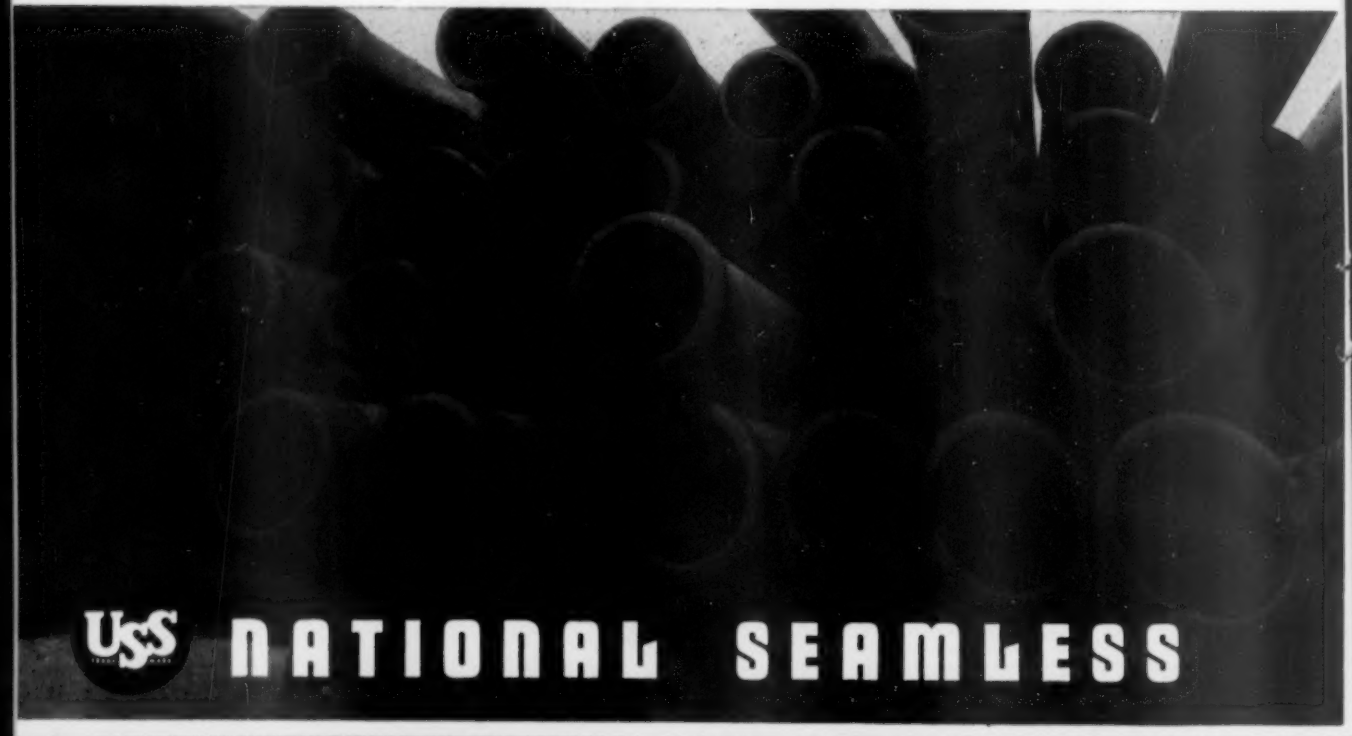
An extremely high-strength casing possessing a uniformity of physical properties which gives it high collapse resistance and greatly increased joint strength. It is hydrostatically tested to 80% of minimum yield strength up to a maximum of 10,000 p.s.i.

**National Deep-Well Casing**

A stronger casing than is provided under A.P.I. specifications, to meet constantly increasing depths. Due to the severe service for which it is intended, it is hydrostatically tested to 80% of minimum yield strength up to a maximum of 12,000 p.s.i.

**National (B) Buttress-Thread Casing**

Developed to satisfy the need for a casing joint which will safely and economically support the weight of deep-well casing. The buttress-thread joint is comparable in strength to that of the body of the pipe.




UNITED STATES STEEL

# underground?

**NATIONAL DEEP-WELL CASING** is made from quenched and tempered carbon-manganese steel. It has approximately 25% to 45% greater collapse resistance than the same size N-80 casing. This superiority is even more pronounced at high axial tension stress levels. Perforating tests with bullet and jet guns have resulted in perfect performance by this super-tough casing. No cracking occurred, even though the shots were very close together.

**For further information,** write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Ask for Bulletin No. 15.

* * *

**NATIONAL TUBE DIVISION**
**UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.**
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

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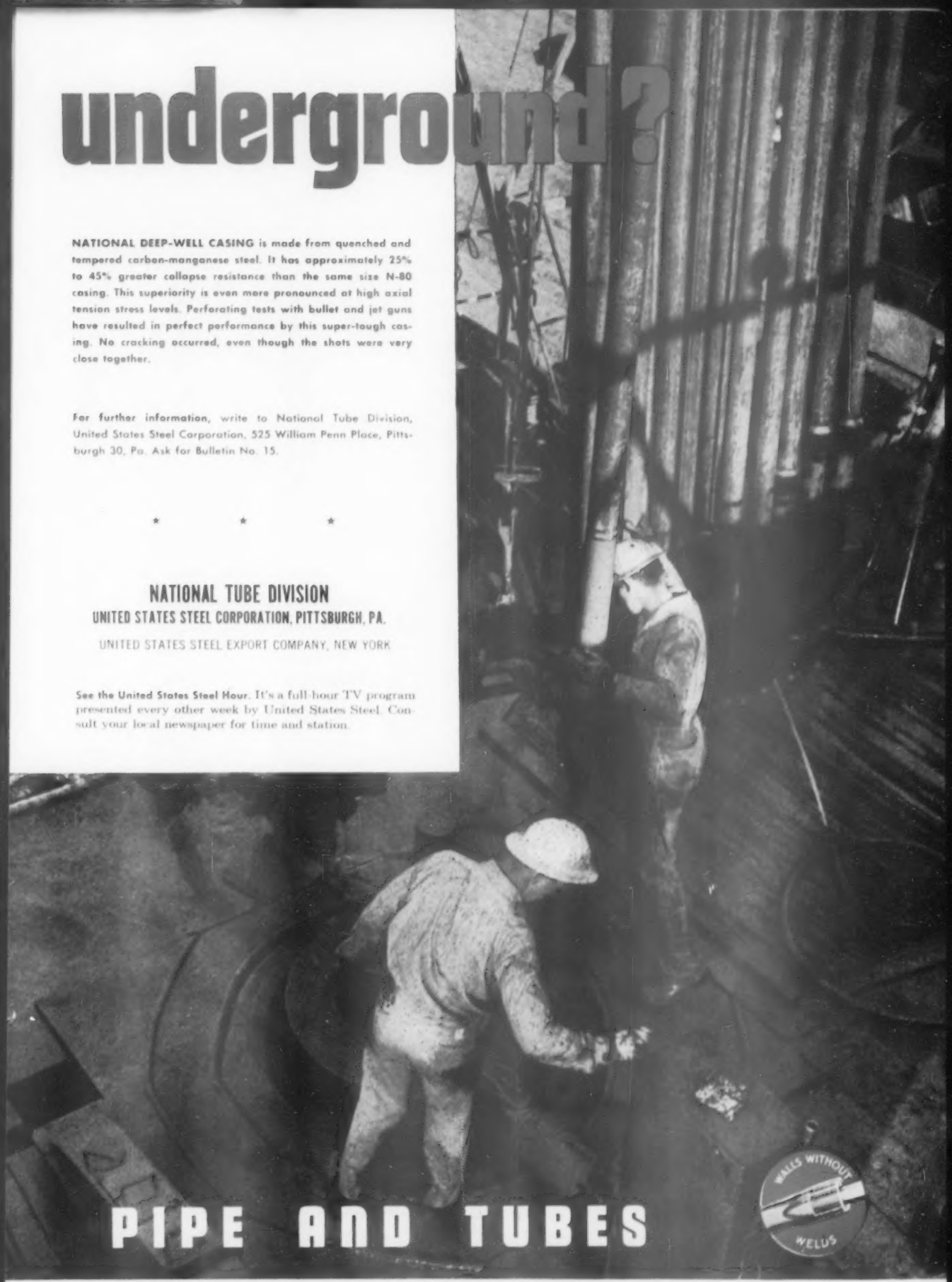
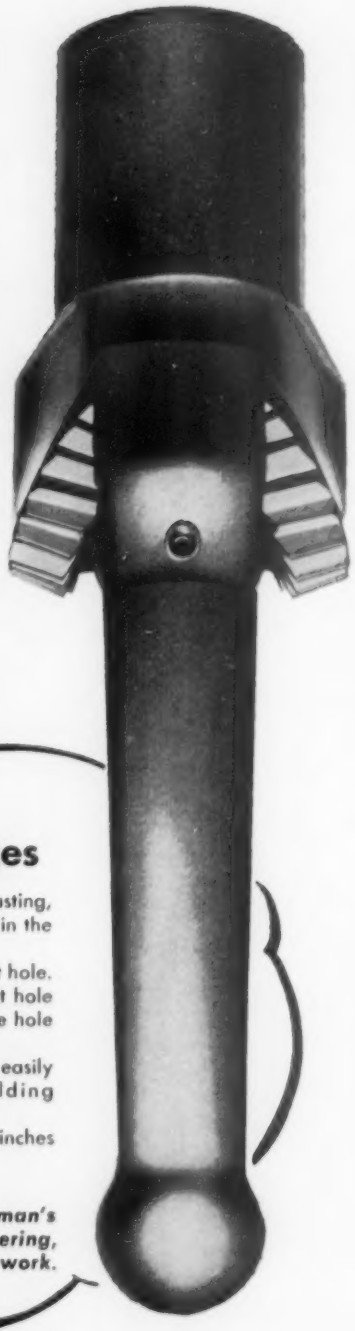



**PIPE AND TUBES**

UNITED STATES STEEL

# NEW EASTCO 2 CUTTER HOLE OPENER



EASTMAN OIL WELL SURVEY COMPANY
Eastman
25th ANNIVERSARY
1930 ★ 1955

**The tool that's made explicitly for directional drilling work, and used to ream pilot holes to full gauge.**

## Just look at these outstanding advantages

- The entire body is a one piece steel casting, preventing "back-off" or "break-off" in the hole.
- Flat sides of pilot helps get into the rat hole.
- Ball end of pilot centers reamer in rat hole — reducing danger of sidetracking the hole to be reamed.
- Rugged roller bearing cutters that are easily and quickly changed. No welding necessary.
- Available in sizes ranging from 5⅜ inches to 14½ inches.

***. . . another tool perfected from Eastman's years of field experience, engineering, research and design development work.***

**For further details call the Eastman office nearest you.**

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**Eastman Oil Well Survey Company**
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***Export Sales and Service:***
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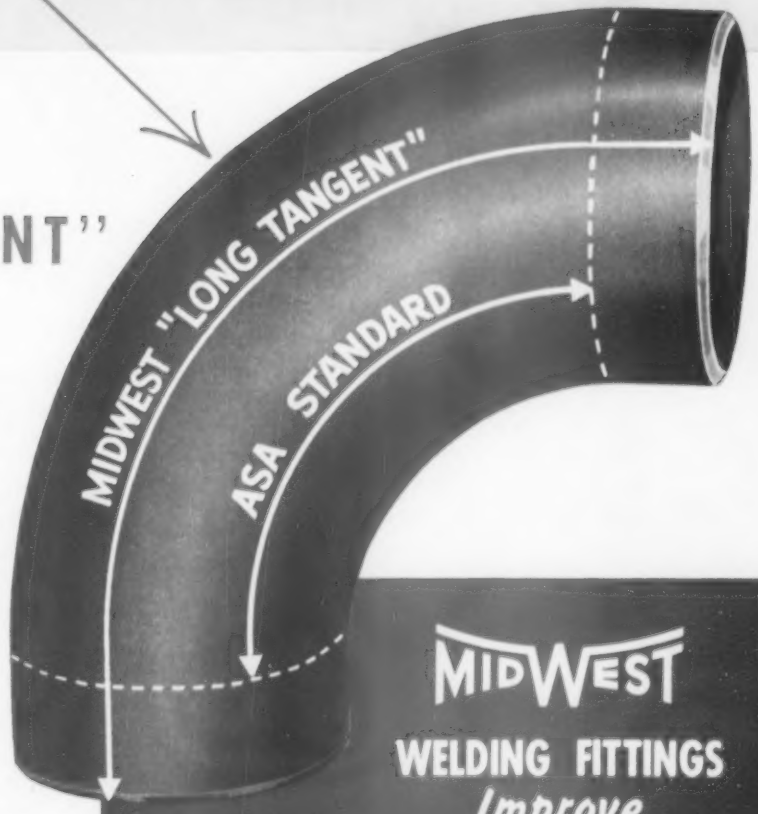
**P. O. Box 1500 Denver, Colorado**

# King Size (but at no extra cost)

MIDWEST

## "LONG TANGENT" ELBOWS




Among all standard welding elbows, only Midwest "Long Tangent" Elbows can be described as "*King Size*" . . . only they have the long straight ends which equal ¼ of the nominal fitting diameter (a 12" Midwest "Long Tangent" Elbow has tangents 3" long). This greater length is responsible for significant savings on many piping systems (see advantages listed below). For additional information, ask your Midwest distributor or write us for Catalog 54.

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*Plants: St. Louis, Passaic and Los Angeles*

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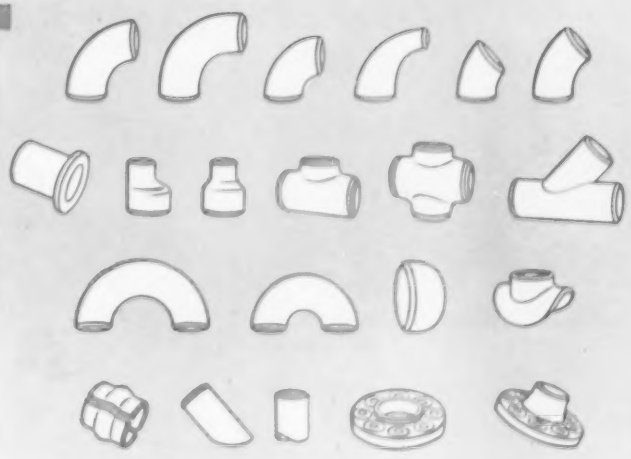
*STOCKING DISTRIBUTORS IN PRINCIPAL CITIES*

MIDWEST
**WELDING FITTINGS** *Improve* **PIPING DESIGN and REDUCE COSTS**

## ADVANTAGES OF MIDWEST "LONG TANGENT" ELBOWS

- ★ They save pipe.
- ★ They often eliminate short nipples and their extra welds.
- ★ They save time and money in lining up and clamping pipe and fitting.
- ★ They make it easier to apply slip-on flanges.
- ★ They remove the circumferential weld from point of maximum stress and can be sleeved.
- ★ THEY COST NO MORE THAN OTHER ELBOWS.



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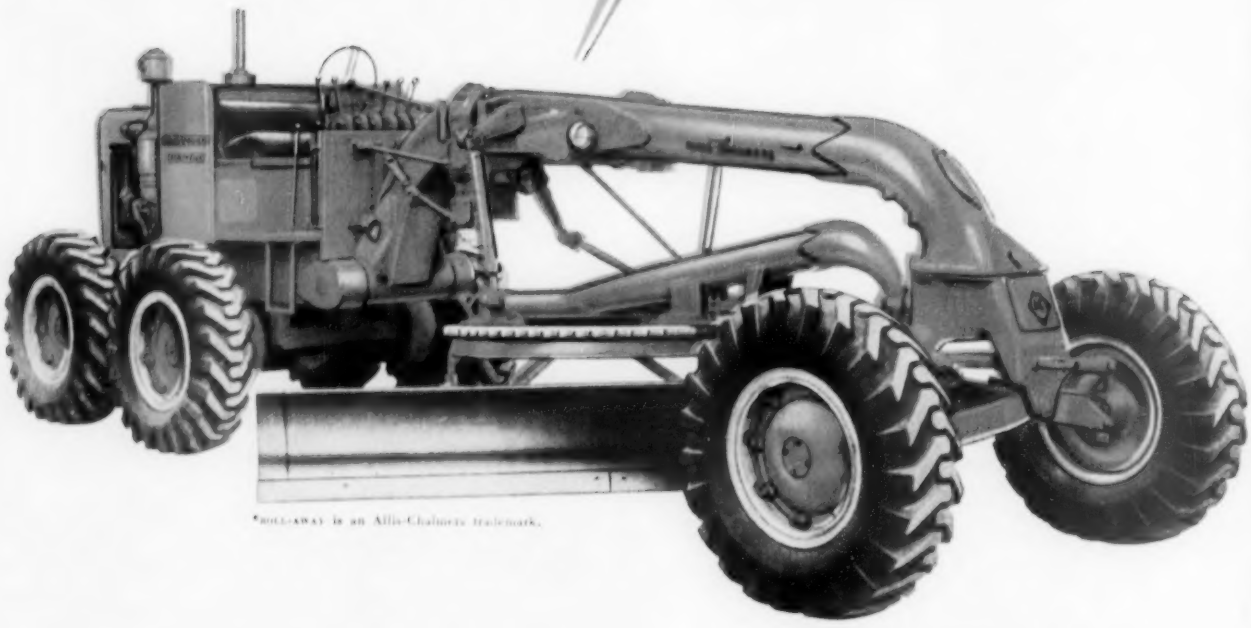
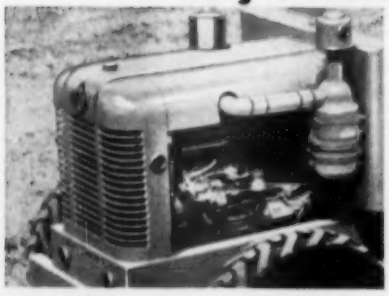
## ALLIS-CHALMERS BIG NEW

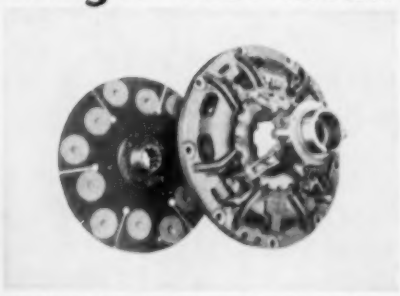


*ROLL-AWAY is an Allis-Chalmers trademark.

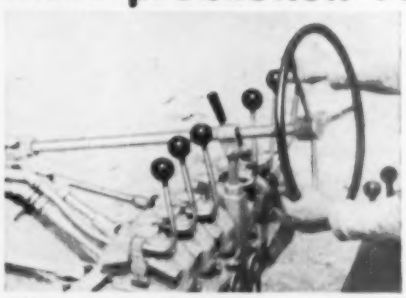
## Major advantages that mean more production . . .



**Powerful new Allis-Chalmers diesel** featuring exclusive "follow-through" combustion for smooth performance, clean combustion, extra-long life.



**Exclusive new ceramic clutch lining** sets new standards of long clutch life, keeps clutch operating longer between adjustments, reduces lever pull.



**All-new toggle-type controls** give a *Forty Five* operator precision control with positive "feel" — in addition to easy finger-tip action regardless of load.

# Forty Five MOTOR GRADER

**120 HORSEPOWER • 23,800 POUNDS**

The *Forty Five* is a truly modern heavy-duty motor grader . . . designed for progress and built to *today's* standards of accuracy, dependability, operating ease and low cost. On any construction or maintenance job, you'll see all the advantages of balanced power, weight, traction and proper speeds . . . plus brand new advantages for the operator and mechanic that no other heavy-duty grader offers.

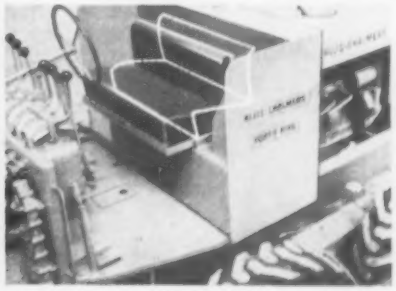
We invite you to check the features shown here. Then for the full story on the *Forty Five* — including extra-big clearances, exclusive ROLL-AWAY* moldboard, single-member tubular frame and fully enclosed power steering —see your nearby Allis-Chalmers dealer.

CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

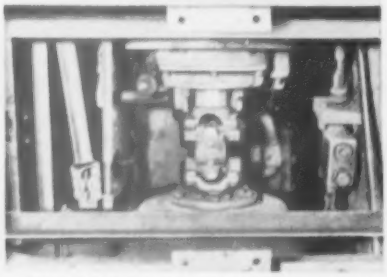
ALLIS-CHALMERS

## . . . less maintenance . . . easier and better operation!

**New accelerator-decelerator pedal** lets the operator increase or decrease engine speed with his foot — without changing his hand throttle setting.



**"Box seat" comfort and visibility.** Foam-rubber seat adjusts for sit-down or stand-up operation. Flat, roomy platform has tapered corners for top blade visibility.



**Matchless servicing accessibility.** Unit construction permits easy service or removal of clutch, transmission or engine without disturbing adjacent parts.

# The NEW

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## 'L' SERIES PUMPING UNIT

**Now in production, the LEGRAND "L" SERIES of pumping units contains a model to meet every need in mechanical pumping (from 4,000 lbs. to 25,000 lbs. polished rod load and 24" to 72" stroke) incorporating up-to-date design features derived from many years of practical field experience.**

## • DESIGN FEATURES

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- **A.P.I. Standard Gear Reducers.**
- **LEGRAND Patent Double-Taper Wristpins.**
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- **Lateral and fore-and-aft Beam adjustment.**
- **Swing-back Mulehead.**
- **LEGRAND Patent Carrier Bar.**
- **Central-point Lubrication.**
- **All bolting in "unified" series.**

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*Wherever weeds and grasses are a*

**FIRE HAZARD...** *you need*

*this reliable weed destroyer!*

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## WEED KILLER

Borascu gives you the safety of bare ground about any installation at any location—well sites, tank batteries, heater units, and buildings. And you get this freedom from fire-hazardous vegetation with lower cost than other methods! Some economy-minded production men figure the Borascu way has resulted in 80% savings!

Borascu is a granular, nonorganic, nonselective weed killer which affects *all* vegetation! Borascu does not break down in soil but remains active for long periods to keep vegetation from reappearing. Just a man and a pail is all you require for applications—no other equipment is necessary; there is nothing to mix and no water to haul. You won't know how easy it is to keep grounds bare of fire-hazardous weeds and grasses 'til you try Borascu!

WHEN BORASCU'S IN THE SOIL... WEEDS STAY OUT!

NOTHING TO MIX
NO WATER TO HAUL
NONPOISONOUS
NONCORROSIVE TO FERROUS METALS

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OVER 40 SIZES RANGING FROM 4000 LB. POLISHED ROD CAPACITY AND 10,000 IN. LB. PEAK TORQUE TO 30,000 LB. POLISHED ROD CAPACITY AND 640,000 IN. LB. PEAK TORQUE

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| C-456DB-144-30 | |
| C-456DB-120-30 | |
| C-456DB-108-30 | |
| * C-320D-120-25 | |
| C-320D-84-30 | |
| C-320D-84-27 | |
| C-320D-74-27 | C-114DA-54-16A |
| C-320D-74-25 | C-114DA-54-15 |
| C-228D-74-27 | C-114DA-54-14 |
| C-228D-74-23 | C-114DA-54-13.5 |
| C-228D-74-20 | C-114DA-48-14 |
| C-228D-64-23 | C-114DA-42-10.5 |
| C-228D-64-20 | C-80DB-48-14 |
| C-160D-74-20 | C-80DB-42-10.5 |
| C-160D-64-23 | C-57D-48-10 |
| C-160D-64-15 | C-57D-42-10.5 |
| C-160D-54-18 | C-40D-40-7.4 |
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*These Units Are Also Available With Single Reduction Gear Reducers*

The new "C" series offers a greater variety of combinations of torque, counter-balance, and polished rod capacity to suit any conceivable well condition.

*LET YOUR LUFKIN REPRESENTATIVE ASSIST IN SELECTING THE PROPER AND MOST ECONOMICAL UNIT FOR YOUR REQUIREMENTS.*

EXPLANATION OF UNIT DESIGNATION

* C —For Crank Counterbalance

320D—Gear Reducer (320,000 Lb. In. Peak Torque Double Reduction)

120 —Maximum Stroke (120 Inches)

25 —Peak Polished Rod Capacity (25,000 Lb.)

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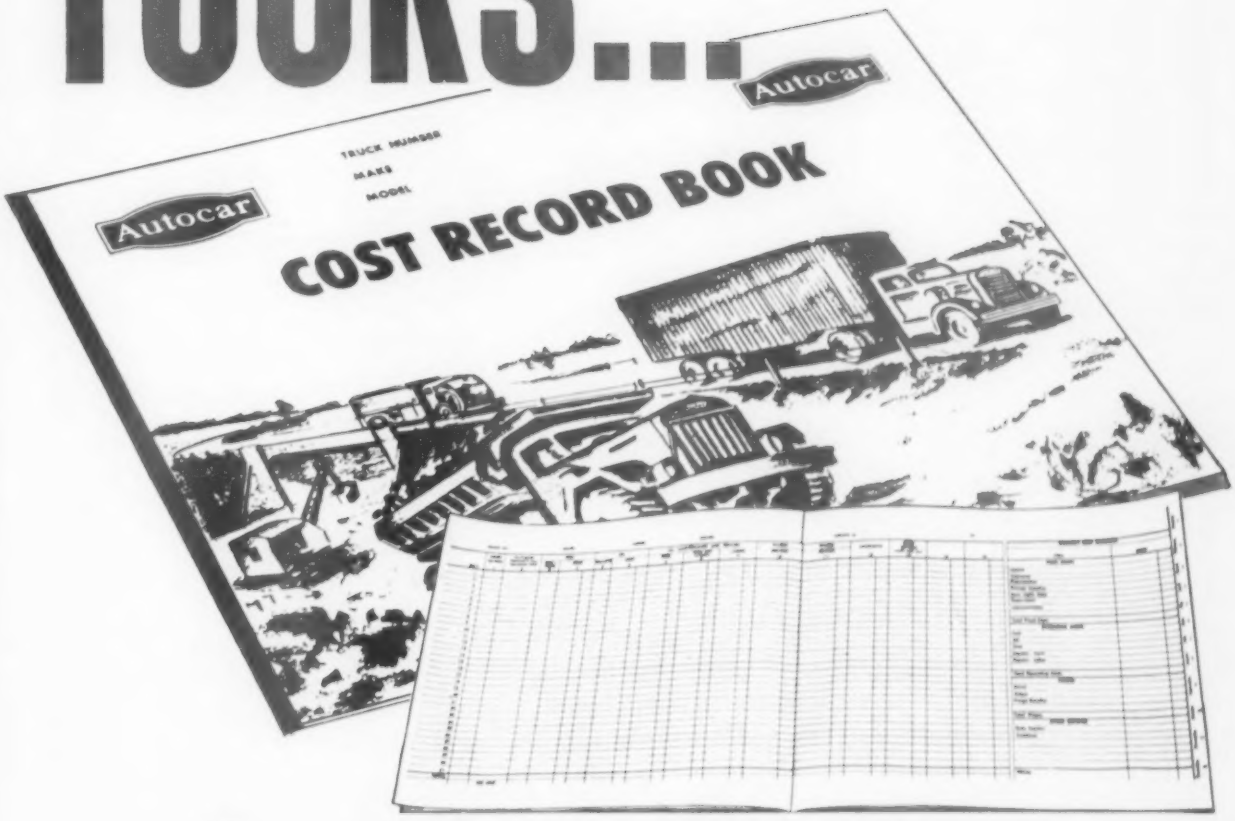


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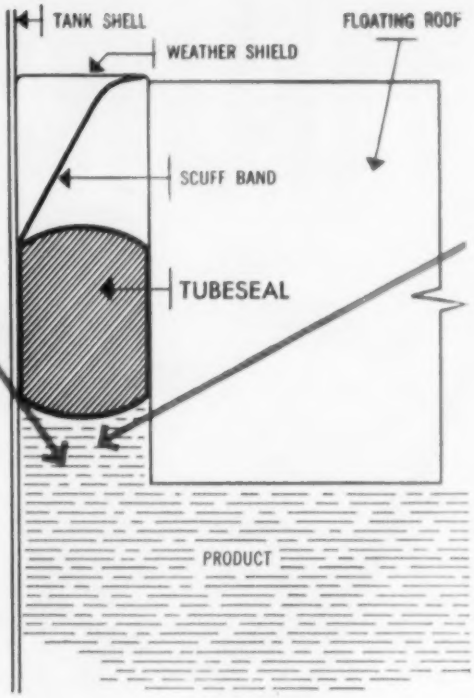
# NO ROOM FOR VAPORS*

*NO EVAPORATION
NO FIRES
MINIMUM CORROSION




Because there is no space in a HAMMOND TUBESEAL FLOATING ROOF, where vapor can form, jet fuels and other volatile products can be stored with assurance that evaporation and fires cannot take place and further that corrosion will be kept to a bare minimum.

## THE HAMMOND TUBESEAL

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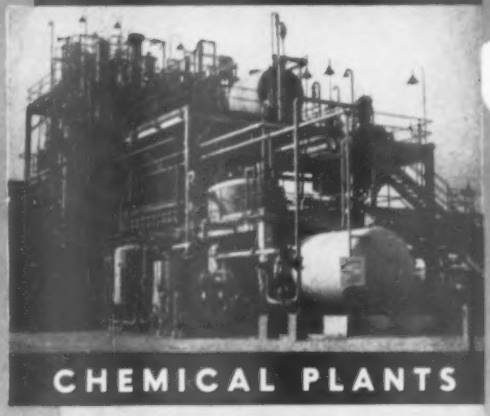

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There are good reasons behind the trust which America's key industries have placed in Vogt valves, fittings, and flanges for half a century. They know that *drop forged materials* are uniform in structure, fine grained, and free from porosity. They know, too, and appreciate the meticulous care given these products through every stage of forging and machining in Vogt's modern shops, and about the many rigid tests and inspections. And that is why these products enjoy such an impressive record of performance in withstanding the shocks and stresses imposed by high or low pressures and temperatures and in resistance to erosive and corrosive conditions.

Service is another important factor in this confidence because Vogt maintains the world's largest and most complete stock of drop forged steel valves, fittings, and flanges always ready for immediate shipment.

Write for Catalog F-9. Consult its 400 pages for the complete Vogt line of drop forged steel valves, fittings, and flanges for oil, steam, water, air, gas, and refrigeration services.

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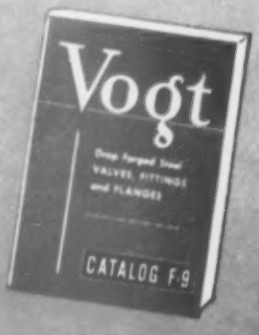


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To make a great part of these successes possible required from petroleum sources the availability of large quantities of high purity benzene, toluene, and xylenes. These aromatics are now produced in exceptionally high purity and large amounts by the UOP Platforming process and are separated by the Udex process, this latter process developed cooperatively by Dow Chemical Company and Universal Oil Products Company and engineered and licensed by UOP. With these processes a ready supply of aromatics will always be assured.

Unheard of only a short time ago, these developments have become just the beginning for an unlimited future.

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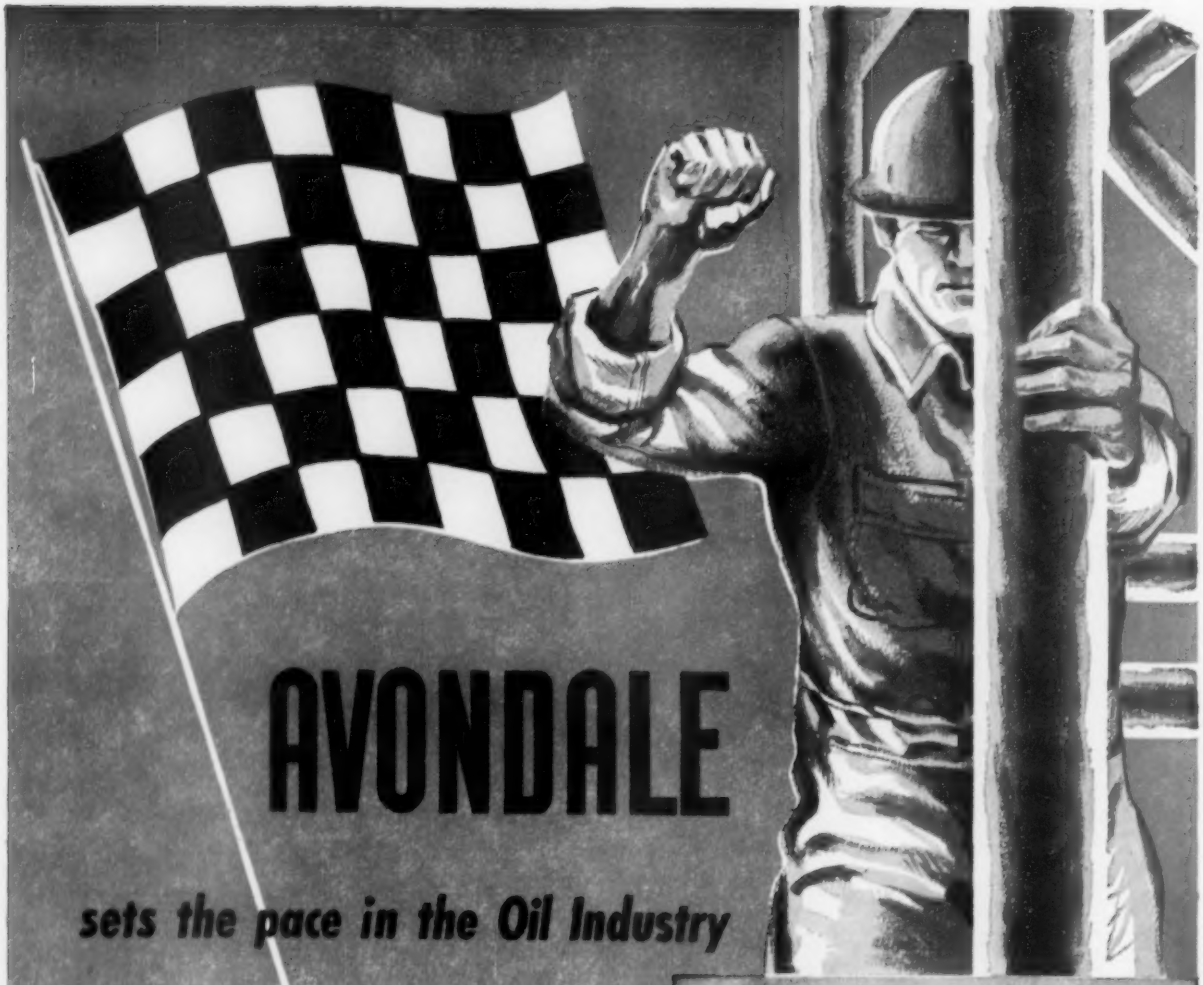
UOP *Universal Service Protects Your Investment*



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Instead of a center groove, the gears in a Farrel® speed increaser have a *backbone*, formed where the helices meet. This *backbone* puts the full face width of each gear to work transmitting power. Result: Extra strength and greater load-carrying capacity in smaller space.

What's more, the gears are precision generated by the Farrel-Sykes process. The inherent accuracy of this method of generation pays off in continuously smooth, efficient gear operation—particularly important where non-stop performance is essential.

The "perfection of engineering" in a Farrel speed increaser is a matter of record. Since 1932, when the first of these units was put into service, not a single one has ever been replaced.

This record is worth remembering when you are in the market for speed increasers. It provides a virtual guarantee of trouble-free performance. Ask for bulletin 448-A.

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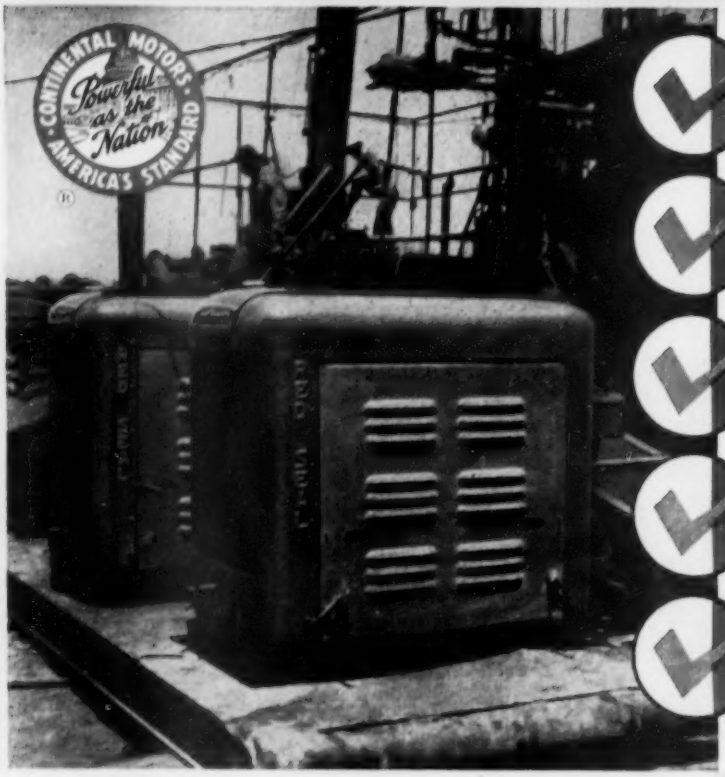


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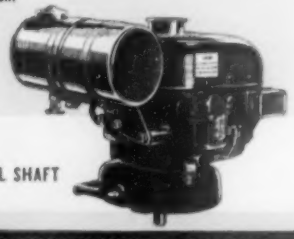
•

**AUTHORIZED SERVICE** and genuine Red Seal parts available from coast to coast.

By standardizing on Continental Red Seal engines in the oil field, you get ALL THE THINGS that add up to dependable oil field power. There's a Red Seal model engineered and built for almost every application in drilling, processing, and dozens of standby uses. Overhead-valve and L-head models for use with all standard fuels are available as bare engines or as power units, open or closed. Ask your oil field supply store or write for full information.

IN ADDITION TO ITS LARGE ENGINES, Continental builds an outstanding line of heavy-duty air-cooled four-cycle models for industrial and farm applications requiring 2 to 3 h.p. Advanced engineering gives them easy starting, high dependability, and unusual lugging capacity at low speeds . . . Options: patented and exclusive Contex® external ignition system, low-level ignition cut-off, 6-1 reduction gear, and other features. Available also for use on kerosene . . . For information on these models, address Air-Cooled Industrial Engine Division, 12800 Kercheval Ave., Detroit 15, Michigan.



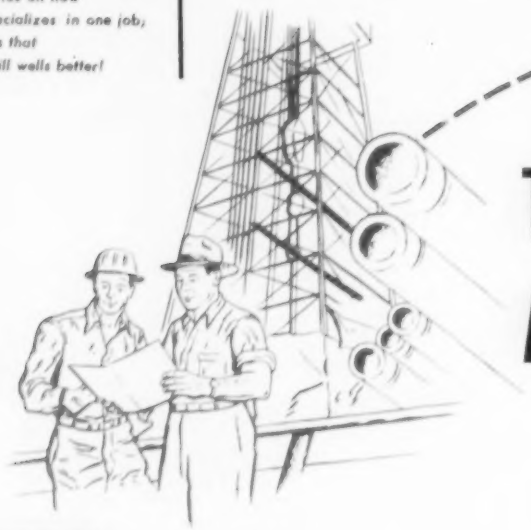
AD SERIES
VERTICAL SHAFT

**Continental Motors Corporation**
MUSKEGON • MICHIGAN

6 EAST 45TH STREET, NEW YORK 17, NEW YORK • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 SOUTH SANTA FE AVENUE, LOS ANGELES 58, CALIFORNIA • 910 SOUTH BOSTON STREET, ROOM 1008, TULSA, OKLAHOMA • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA), GEORGIA

GRANT
OIL TOOL COMPANY

*No. 5 of a series on how Grant specializes in one job, Building the tools that help you drill wells better!*



# TAKE A LOOK AT THE LOG!

Drillblade Stabilizer

## *There's where you'll find the FACTS on GRANT DRILBLADE STABILIZER PERFORMANCE...*

**FASTER PENETRATION RATES** because the Grant Drillblade stabilizes and centers the string to permit *more weight on the bit without increased hole deviation.* You'll find fewer round trips in the log, too. And you'll see

**LESS DRILL COLLAR WEAR** in high angle hole because the Grant effectively centers and stabilizes those long collar strings to prevent wear against the hole wall. Look in the log also for

**BETTER HOLE CONDITIONING** in rough formation. The Grant has three husky blades that give far *more* bearing area. Blades stay in gauge longer . . . provide better support in soft formations . . . smooth out rough spots left by the bit in loose formation. Check the log for

**GREATER DRILLING SAFETY** because the hollow construction of the blades permits easy mill-outs with the same rotary shoe you use to free your string if it becomes stuck in the hole. You safeguard your string when you run the Drillblade!

Model 1540 Wall Scraper | Underreamer | Cushion Stabilizer | Model 1530 Regular Reamer | Model 6480 A Reamer Near Bit Type

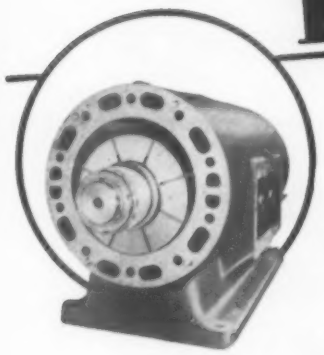
**Made in two types—the near-bit type for directional work, and the up-string type for all stabilizing requirements in the drill collar and pipe string. Available with a wide variety of blade sizes for precise control in directional drilling. These give you *all* the dollar-saving advantages of full stabilization and faster digging with Grant. *For Drillblade details, ask your Grant service man, or write direct for Bulletin 61!***

# GRANT
## OIL TOOL COMPANY

Main Office and Plant: 2042 East Vernon Avenue, Los Angeles 58, California

CALIFORNIA—Ventura—Phone Willow 3-6767
Kern—Phone 225
Bakersfield—Phone FAirview 5-6607
Compton—Phone Newmark 3-8041
TEXAS—Odessa—Phone 6-4802
Houston—Phone Mission 4-2631
LOUISIANA—Lafayette—Phone 3-7648
NEW MEXICO—Hobbs—Phone 3-6211
CANADA—Edmonton—Phone 39-2233
EXPORT—New York City—Phone Hanover 2-0455

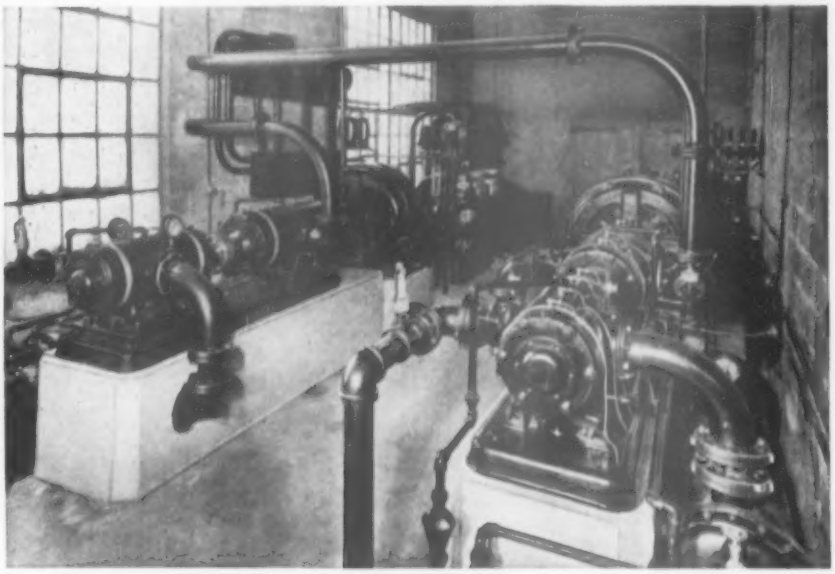
# Fuller *pioneered*



## the two-stage **rotary** compressor . . . for general industrial use . . . starting in 1930

**INSTALLED 1930**
**STILL GOING STRONG** ➡

Two Fuller Rotary Two-stage Compressors. Capacity each 740 c.f.m., 100-lb. pressure.



Fuller Company not only pioneered the rotary compressor for industrial use in this country, but it has always stressed the "spotting" of compressors. There's nothing new or startling about this principle . . . Fuller has advocated it ever since its first machines were put on the market in 1930 . . . applying each compressor to a specific job, with resultant overall plant economy, as well as power savings. Result: the adoption of this economical layout by thousands of users has proved to their satisfaction the soundness of such a program.

Fuller has built and sold thousands of Fuller Rotaries—a large proportion of the two-stage type. And, when plant expansion is necessary, with a consequent demand for more air, additional Fullers are naturally installed.

Fuller engineers have never rested on their oars, but have continually worked to improve design and efficiency, until today, these machines are second to none for dependable air-production in industry.

We welcome the opportunity to present to you all the facts concerning Fuller Rotary Compressors, facts built on actual operational experience. For a complete description of Fuller Rotaries, write for Bulletin C-5A.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

**FULLER COMPANY, Catasauqua, Penna.**

GENERAL AMERICAN TRANSPORTATION CORPORATION SUBSIDIARY

Chicago • San Francisco • Los Angeles • Seattle • Birmingham

C-275
1783

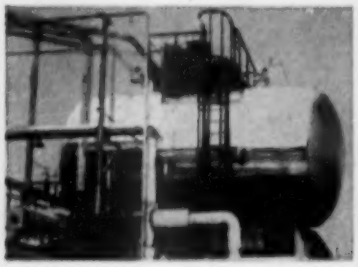
**Fuller**

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

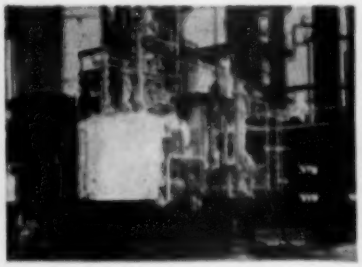
***The standard for comparison in specialized petroleum treating****

# PETRECO®
## ELECTRIC PROCESSING

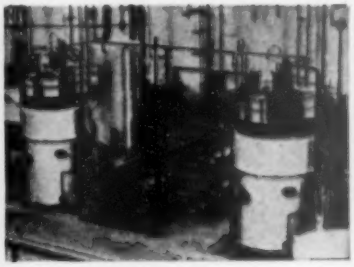
**AUTOMATIC • CONTINUOUS • COMPACT • ECONOMICAL • SERVICED**



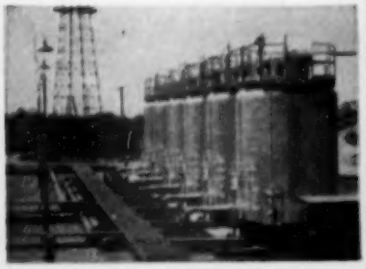
DESALTING ◆
◆ DEHYDRATING

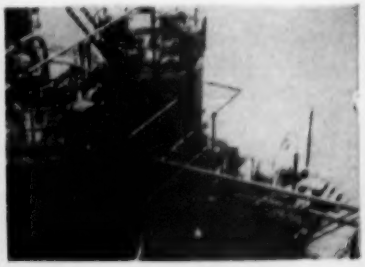


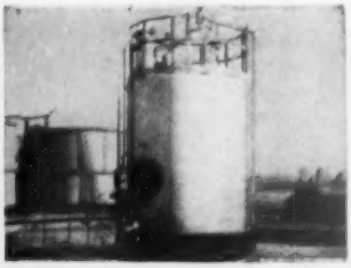
DISTILLATE TREATING ◆
◆ DESAPONIFICATION



LUBE OIL TREATING ◆
◆ SEDIMENT SEPARATION







* Salt and Solids Removal
B.S. & W. Separation
Tank Bottom Treating
Arsenic Removal
Acid Contacting
Caustic Scrubbing
Water Washing
Doctor Treating
Jet Fuel Treating
Cat Cycle Treating
Asphalt Upgrading
Desaponification
Furnace Oil Improvement

AP-1

*FOR COMPLETE INFORMATION, WRITE OR CALL*

**PETRECO®**

A DIVISION OF PETROLITE CORPORATION
3202 South Wayside Drive, Houston 1, Texas
1390 East Burnett Street, Long Beach 6, California

# JONES

## SUCKER RODS

*last longer!*

**Where life hangs by a thread!** A sucker rod string is only as strong as its weakest joint. The latest models of automatic machines are used to accurately thread Jones rods and couplings to close tolerances well within API specifications.

Examine and compare the make-up of a Jones joint. They make up well, fit tight, endure and support continuous heavy loads. There are none finer.

**LOOK FOR THE GREEN RODS**

PESA

PARTNERS IN PETROLEUM PROGRESS

**THE S. M. JONES COMPANY**

*Division of Buffalo-Eclipse Corporation*

General Office and Factory: **TOLEDO, OHIO** • Sales Office: Kennedy Building, **TULSA, OKLAHOMA**

Export Sales Representatives: IDECO—Division of Dresser Equipment Company, Republic National Bank Building, Dallas, Texas and Chanin Building, New York City.

# This is Why the Nash is the Most Simple Compressor

# *It's the Nash!*

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods Data on these pumps sent immediately on request

**No internal wearing parts.**

**No valves, pistons, or vanes.**

**No internal lubrication.**

**Low maintenance cost.**

**Saves floor space.**

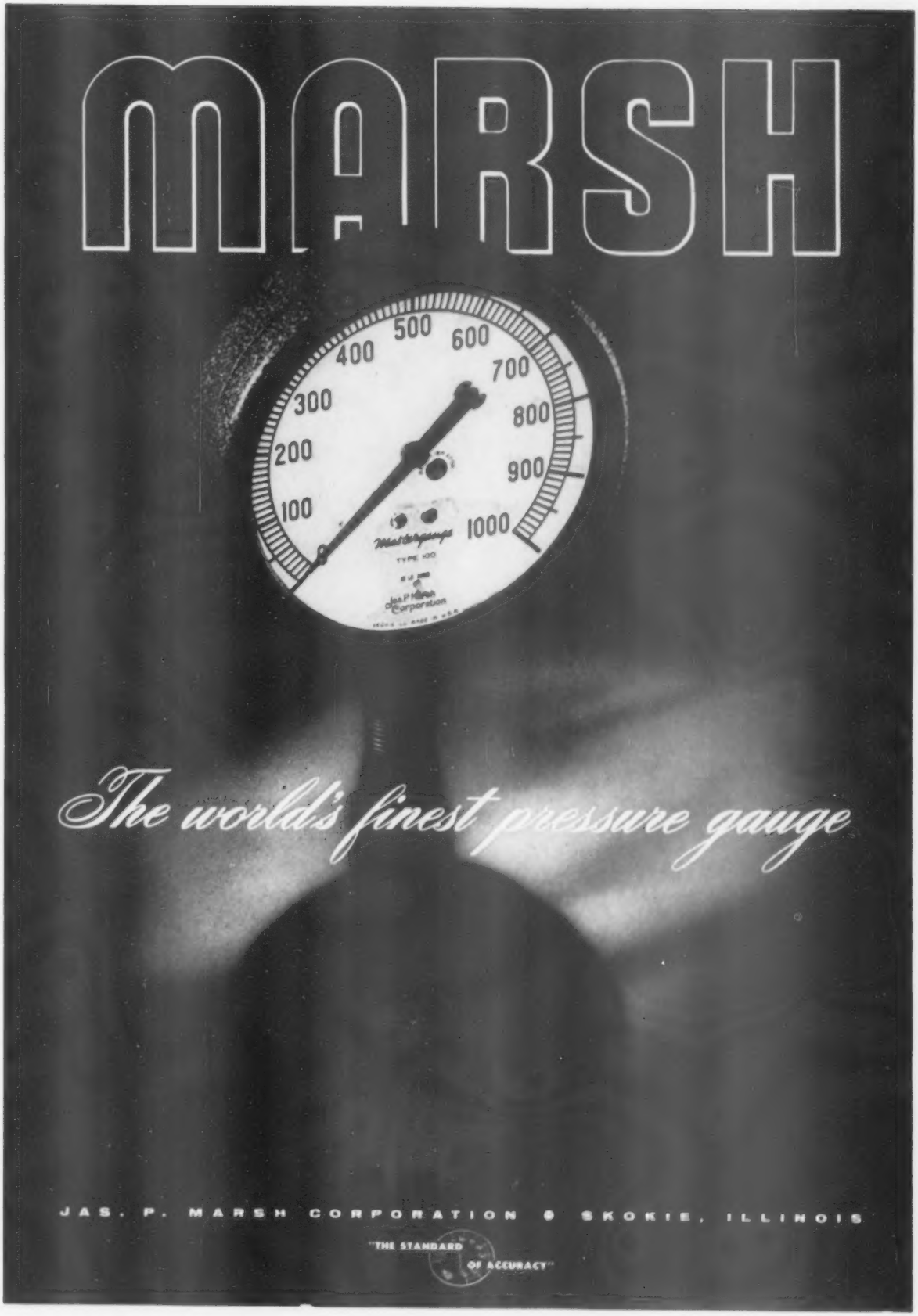
**Desired delivery temperature automatically maintained.**

**Slugs of liquid entering pump will do no harm.**

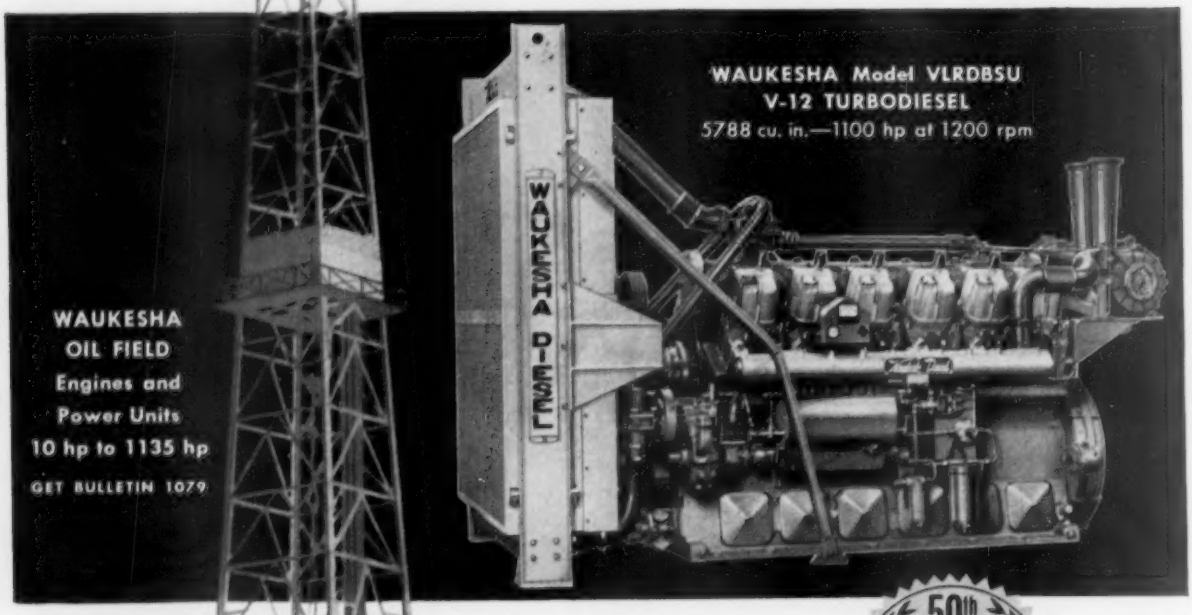
**75 pounds in a single stage.**

**NASH ENGINEERING COMPANY**

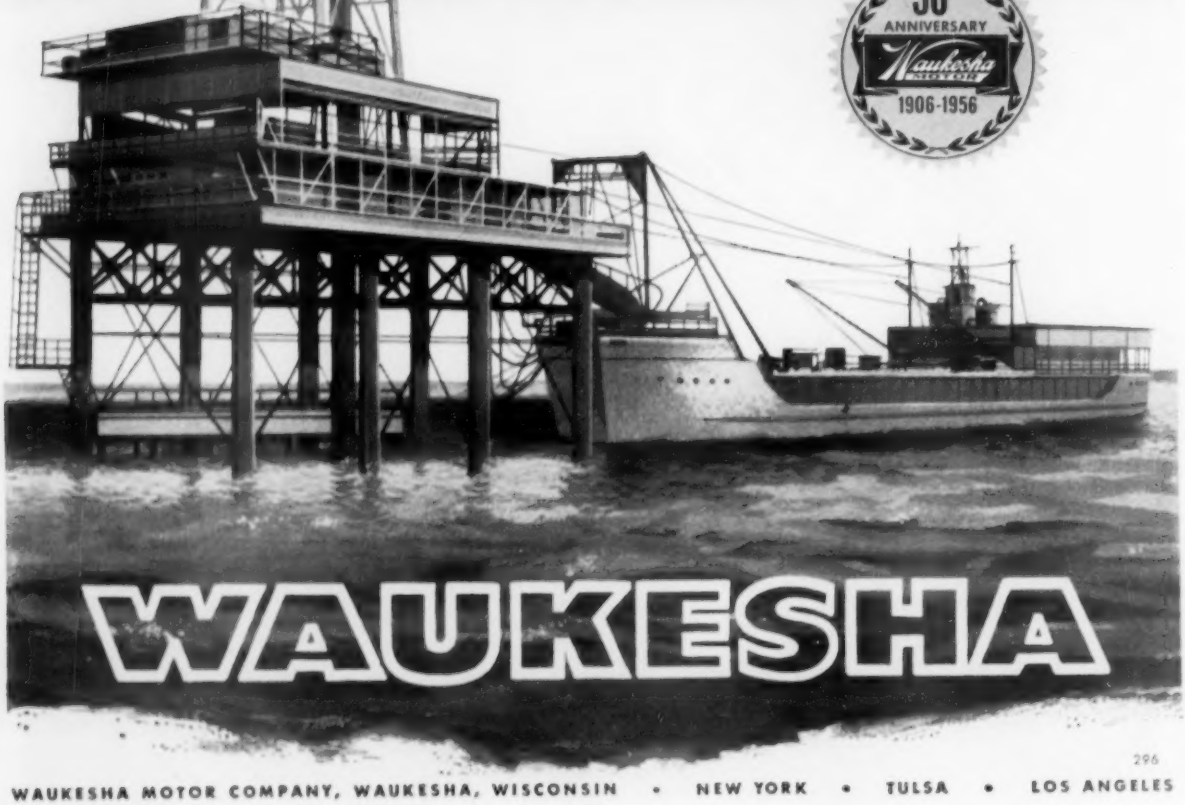
**313 WILSON, SO. NORWALK, CONN.**


MARSH
100
200
300
400
500
600
700
800
900
1000
TYPE 100
Jas P Marsh Corporation
The world's finest pressure gauge
JAS. P. MARSH CORPORATION • SKOKIE, ILLINOIS
"THE STANDARD OF ACCURACY"

# FOR off-shore DRILLING



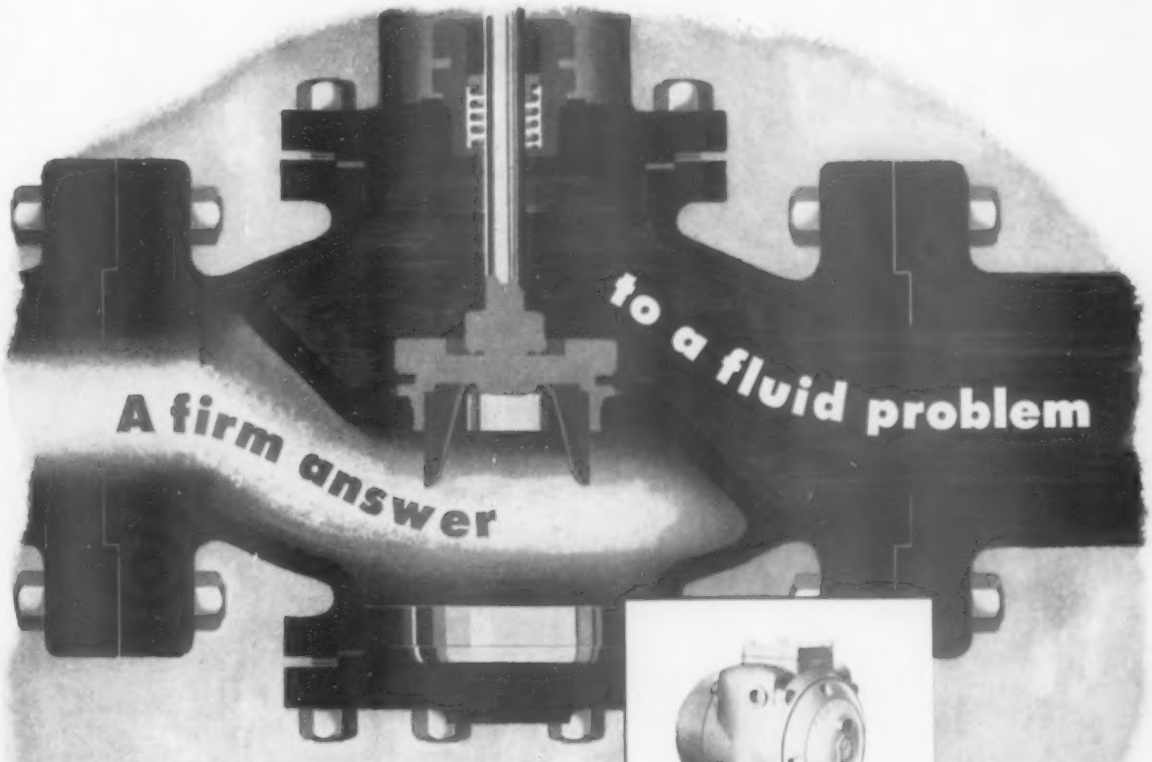

50th ANNIVERSARY
Waukesha
1906-1956



# WAUKESHA

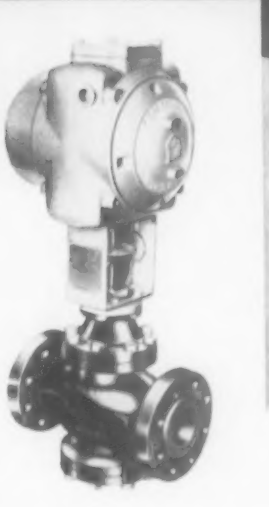
296

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN • NEW YORK • TULSA • LOS ANGELES




***simple, positive, two-wire control for a wide range of valve applications***

Yes, General Controls gives you the answer! *Fast-acting*—because electrical operation assures instant response! *Trouble-free*—because they are electro-hydraulic, with no gear-train problems! *Safe*—because the motor mechanism is in a sealed power unit! *Sure*—because their wide range of valve sizes, materials, and opening-closing speeds will give you the perfect solution to your fluid transfer problems—as they have in thousands of successful control applications throughout the food, process, and oil industries. There's no question—specify General Controls—and you have the right answer!



## General Controls *High-Speed* MOTOR OPERATED VALVES

| | |
|---|---|
| VALVE TYPES | Normally Open and Normally Closed Shut-Off Control. |
| BODY SIZES | 3/8" to 8" ips. |
| OPERATING PRESSURES | Up to 6000 psi. |
| BODY STYLES | Globe, Slide Tube, Slide Gate or Saunders; Single or Double Bonneted; Screwed or Flanged Connections. |
| BODY MATERIALS | Cast Iron, Bronze, Cast Carbon Steel, Stainless Steel. |
| INTERNAL TRIM | Bronze, Stainless Steel, Chrome Stainless—Teflon and High Temperature Glands. |
| INNER VALVE TYPES | Quick Opening, Low Lift V-Port, Equal Percentage 100% Drop V-Port, Linear Flow 100% Drop, Port Guided or Stem Guided. |
| OPERATOR SIZES | H-1, H-2, H-3 and H-5 each with 3 Power Ratings of 60, 80 and 180 VA. |
| OPERATING SPEEDS | Variable Opening and Closing Speeds from 4 to 161 Seconds. |
| ELECTRICAL | 2-Wire Control, Fail-Safe on Current Interruption; 24, 115, 230 and 460 Volts, 50/60 Cycle AC. |
| SERVICE | For Water, Steam, Oil, Gas—All Types of Liquids and Gases Including Corrosive Chemicals, High Temperatures and Pressures. |
| ACCESSORIES | Weather Proof and Explosion Proof Housings, Dust Shields, Limit Switches, Heaters, Manual Operation. |

# GENERAL CONTROLS

MANUFACTURERS OF AUTOMATIC CONTROLS FOR HOME, INDUSTRY AND THE MILITARY

GENERAL CONTROLS • PERFEX CONTROLS

40 FACTORY BRANCH OFFICES SERVING THE UNITED STATES AND CANADA

FIVE PLANTS: IRON MOUNTAIN, MICHIGAN • GLENDALE, CALIFORNIA • BURBANK, CALIFORNIA • SKOKIE, ILLINOIS • GUELPH, CANADA

# HOW TO BUY ROTARY HOSE

## FOR LONGER, TROUBLE-FREE DRILLING

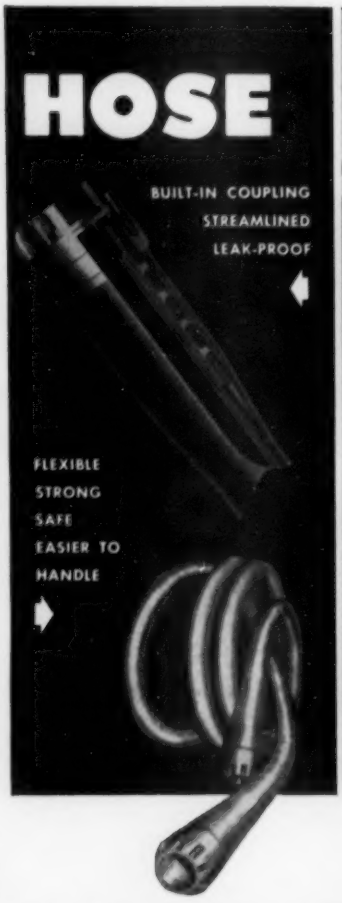
### . . . and get "More Use per Dollar"

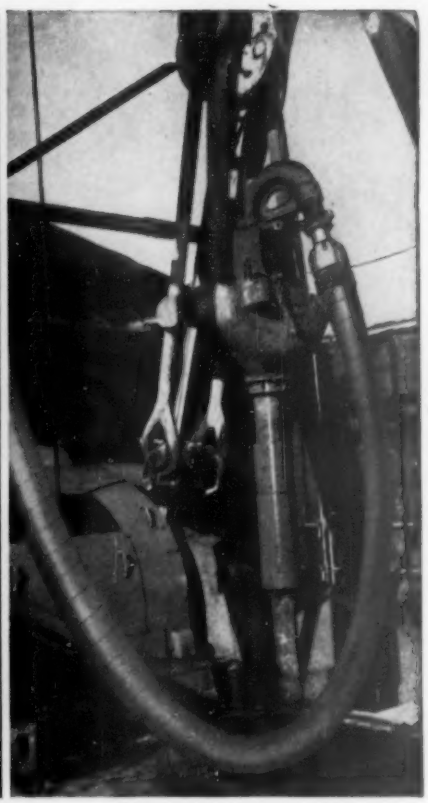
Select a hose construction with an engineered strength member reinforcement properly positioned for maximum safety, flexibility and long life.

Rotary hose with the strength member properly engineered in design and position has high flexibility without bulk. . . . is easier to rig-up without accident . . . holds steadier in the derrick and resists whipping under high pressures of deep drilling. Solid wire strength member reinforcement, as used in some hose, is stiffer and more vulnerable to kinking at bending points. Such hose is weakened by extra bulk, insufficient safety factor and abuses which can lead to eventual hose failure. Hose that is flexible, yet strong, is safer on the job because it is easier to handle . . . less likely to be abused or damaged when transported from location to location.

The hose coupling is also vital to hose safety and long life. Make certain the coupling on your hose is designed without protruding lugs or flanges . . . engineered to prevent costly leaks and dangerous blowouts.

Specify by name the one rotary hose specially developed to insure longer, safer use . . . specify "Ray-Man" CBL Rotary Hose.



## RAY-MAN CBL ROTARY HOSE

The Manhattan method of applying high tensile steel cable under precisioned tension makes Ray-Man CBL Rotary Hose unequalled for strength, flexibility and safety. It has unusual resistance to kinking or accidental crushing. This special reinforcement also makes it easier to make up on the rig. Ray-Man CBL Rotary Hose features Manhattan's streamlined, built-in coupling with the leak-proof "Lip-Lok" Seal that tightens under pressure for even greater safety. These features, plus Manhattan's oil-proof tube, add up to easy handling and trouble-free service at less cost. Write for Bulletin #6743 which tells you how you can drill more hole per hose . . . get "More Use per Dollar" with Ray-Man CBL Rotary Hose.

R/M

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

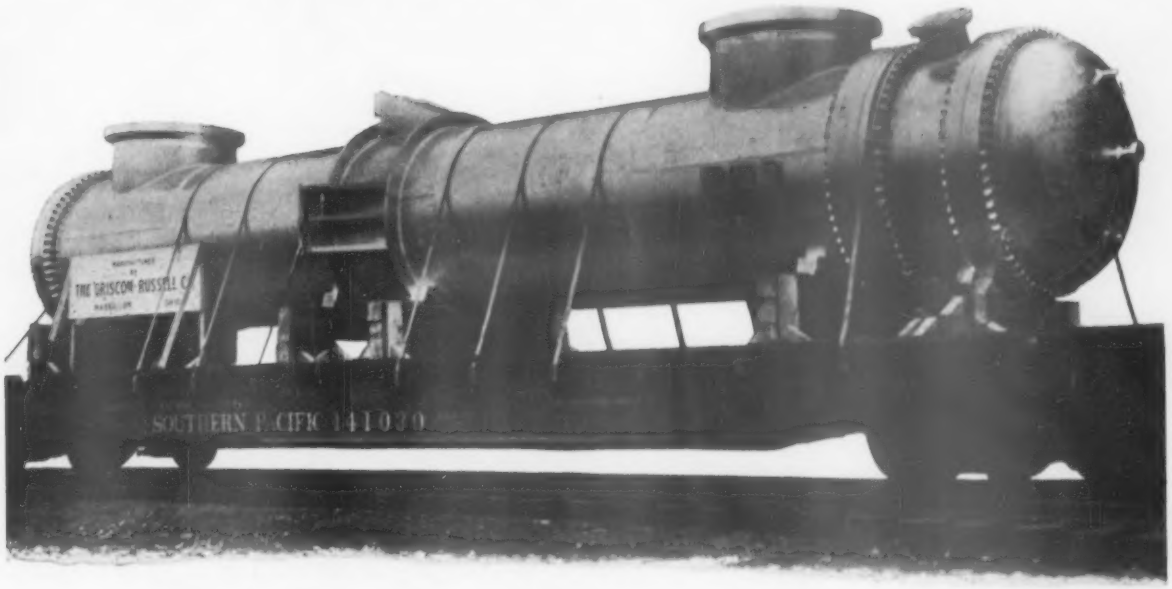
**RAYBESTOS-MANHATTAN, INC.**

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

# No Limit!

## to type of

# G-R Tubular Heat Exchangers




**The huge unit shown above, occupying the full length of a 53-ft flat car on its way from the Griscom-Russell plant, is one example of the G-R manufacturing facilities for heat transfer apparatus.**

**At the other extreme are G-R Heat Exchangers that can be readily handled by one man.**

Between the two extremes of the illustrated G-R Tubular Exchangers are the many types of G-R Heaters, Coolers, Condensers, Evaporators and Heat Exchangers, of which Griscom-Russell has built almost 200,000 to handle all types of liquids, gases and vapors for all industries.

Each G-R design is based on the 85-year specialized experience of the oldest and largest exclusive manufacturer of heat transfer apparatus. Each type has many distinctive features that assure superior effectiveness, economy and durability.

Write for 32-page bulletin describing G-R Tubular Heat Exchangers in detail.

THE GRISCOM-RUSSELL CO.
MASSILLON, OHIO
A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

**G-R**
HEAT TRANSFER APPARATUS
*Tubular Heat Exchangers*

AT LAST I'VE SEEN EVERYTHING, ADMIRAL. WHAT SPECIES OF FISH DOES ONE GET WITH THAT TYPE OF RIG ?

NO SEAFOOD, SHACKLETON, THOSE ROGERS BOYS ARE AFTER SPECIAL SUBSURFACE DATA AND YOU CAN BET YOUR BOTTOM FLIPPER THEY'LL COME UP WITH IT.

**IRogers** *Geophysical Company*

**3616 WEST ALABAMA • HOUSTON, TEXAS**

Edificio Republica
Caracas, Venezuela

Mogadiscio
Italian Somaliland

8 rue de Richelieu
Paris, France

**SINCLAIR OIL CORPORATION**

says

*OK*

*in print*

Thriftiest Boiler
in the business
ANOTHER SINCLAIR FIRST!
SINCLAIR
A Great Name in Oil
SINCLAIR OIL CORPORATION • 600 FIFTH AVENUE • NEW YORK 20, N. Y.

Sinclair Oil Corporation pioneered a new boiler to secure greater efficiency in refinery operation. This advertisement from the Oct. 16, 1954 Business Week emphasizes the results obtained with this unit.

This B&W Carbon Monoxide Boiler, installed to absorb the heat from the exhaust gas stream of Sinclair's new Houston fluid cracking unit, was the first of its kind to go into refinery service. Here are the operating results:

| | |
|---|---|
| Gas weight to boiler—lb per hr | 650,000 |
| Gas temperature to boiler— | 990 |
| Per cent CO in gas stream to boiler—, % by volume | 4.8 |
| Steam from sensible heat and combustible in cracking unit exhaust gas—lb per hr | 220,000 |
| Total steam capacity, boiler and economizer—lb per hr | 330,000 |
| Btu saved from cracking unit gas stream—Btu per hour | 218,000,000 |

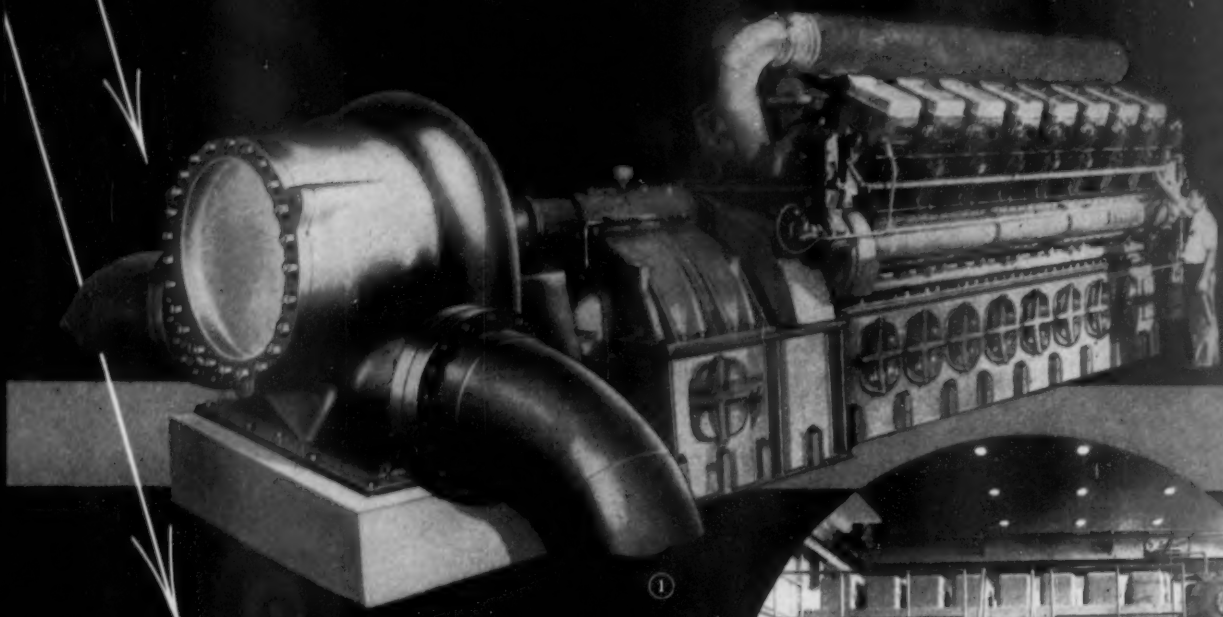
*The Babcock & Wilcox Company, Boiler Division*
*161 East 42nd Street, New York 17, N. Y.*

**BABCOCK & WILCOX**

BOILER DIVISION

G-700

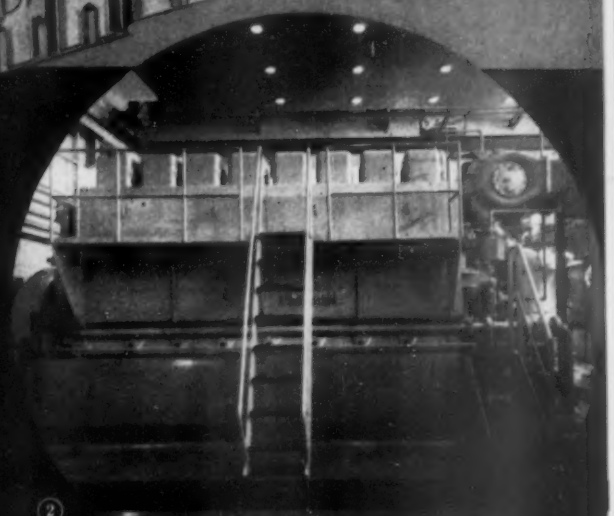
# CUT COSTS on these 3 basic power jobs with NORDBERG *Supairthermal*® ENGINES . . .

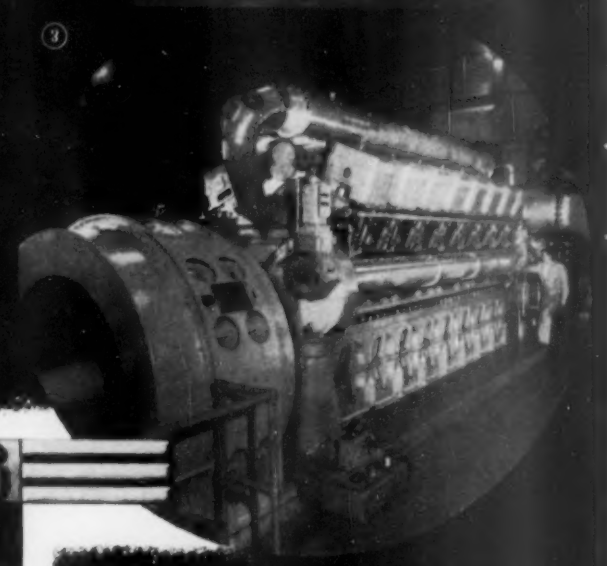


① for **GAS COMPRESSOR DRIVE** Big savings in fuel costs on large capacity gas pipe lines and in refineries can be realized with the Nordberg *Supairthermal* engine gear set, driving a centrifugal gas compressor, for the simple reason that less fuel is required.

② for **PIPE LINE PUMPING** In pipe line pumping service, the trend is toward Nordberg four-cycle *Supairthermal* engine power . . . these engines produce more power in less space—substantially reducing installation and operating costs. What's more—the efficiency of these powerful engines turns low fuel consumption rates into *profit dollars* at the end of the line.

③ for **POWER GENERATION** Nordberg *Supairthermal* engine generating units supply reliable low cost electric power for many petroleum industry applications.





• Nordberg four-cycle *Supairthermal* engines are available in a full range of sizes from 535 to 5000 hp for Diesel, Duafuel® or Spark-Ignition Gas operation, including both In-line and "V" types. The *Supairthermal* principle of operation increases the engine's load-carrying ability at any given speed, over a wide speed range. This reserve power is like "*money in the bank*" when additional capacity is needed. We welcome your inquiry and the opportunity to assist you.

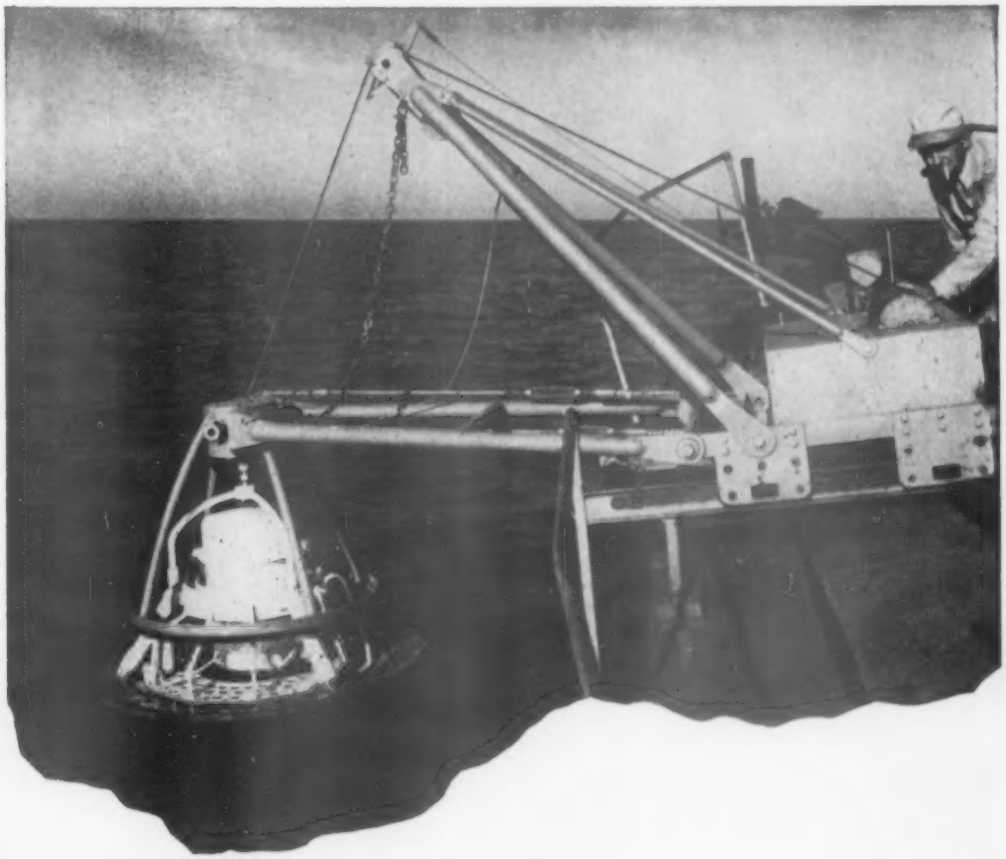
*NORDBERG MFG. CO., Milwaukee, Wis.*

**NORDBERG**

DIESEL • DUAFUEL® AND SPARK-FIRED GAS ENGINES

0555

© 1955, Nordberg Mfg. Co.



# The NORTH AMERICAN *Under Water Gravity Meter*

is <u>unequaled</u> for any under water survey because of its many operating advantages:

- ACCURACY
- DEPENDABILITY
- SIMPLE AUTOMATIC OPERATION
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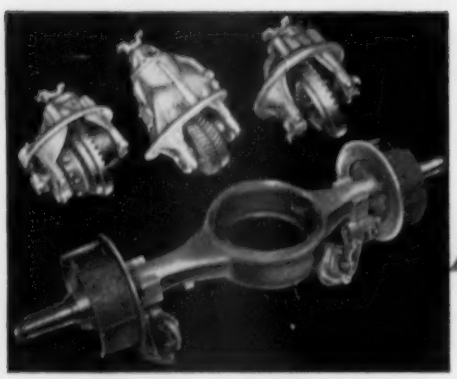
# EATON AXLES

## Proven Performance in Every Type and Size



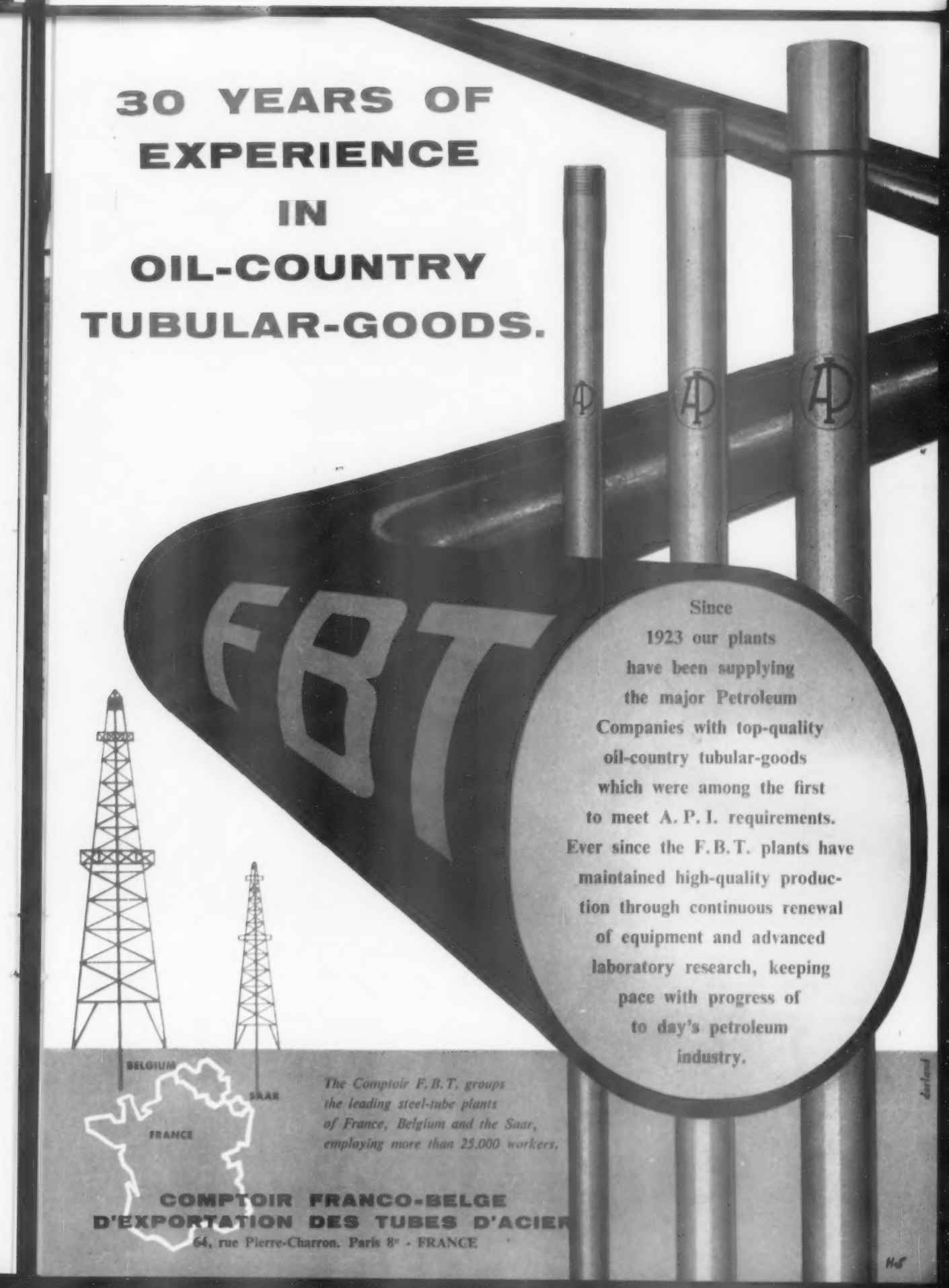
The rugged housing used in famous Eaton 2-Speeds is also used for Eaton single-reduction and double-reduction axles—the three heads are interchangeable.

Behind every Eaton Axle there is almost a half-century of truck axle manufacturing experience. The advanced engineering and quality construction which have made Eaton 2-Speeds famous for stamina and low-cost hauling are also found in Eaton single-reduction, double-reduction, tandem drive axles, and front axles. In more than two million motor trucks, Eaton experience and engineering know-how are reflected in outstanding performance records, minimum hauling costs, and longer vehicle life.

**EATON** AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO

**PRODUCTS:** Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

# 30 YEARS OF EXPERIENCE IN OIL-COUNTRY TUBULAR-GOODS.




Since 1923 our plants have been supplying the major Petroleum Companies with top-quality oil-country tubular-goods which were among the first to meet A. P. I. requirements. Ever since the F.B.T. plants have maintained high-quality production through continuous renewal of equipment and advanced laboratory research, keeping pace with progress of to day's petroleum industry.






*The Comptoir F.B.T. groups the leading steel-tube plants of France, Belgium and the Saar, employing more than 25.000 workers.*

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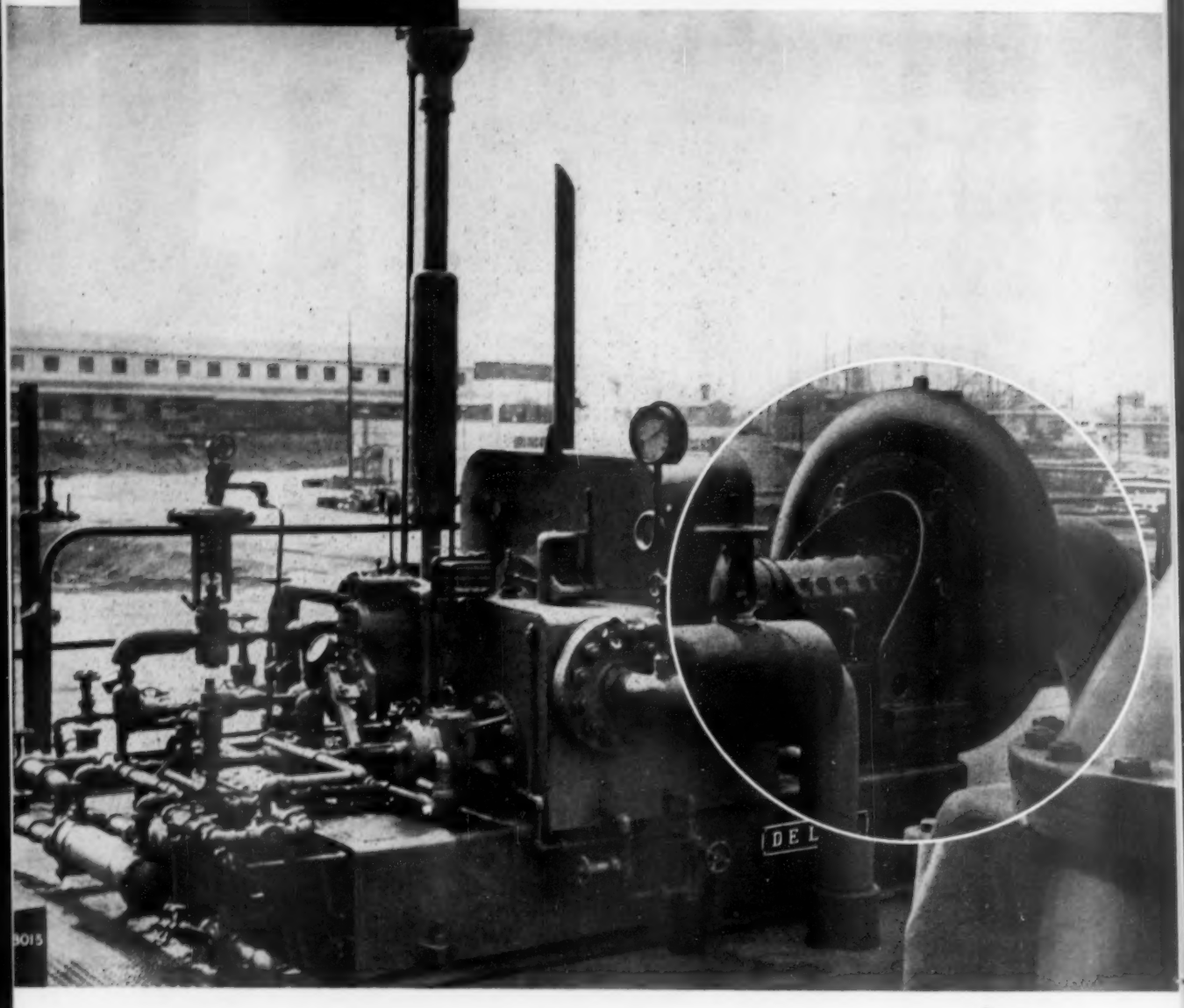
# DE LAVAL
CENTRIFUGAL
BLOWER

## *controls air in cat cracker at Standard Oil of California*




This De Laval centrifugal blower, selected by the Fluor Corporation, is on stream at the Standard Oil Company of California's new cat cracker in El Segundo. For control air service, this blower delivers 9,500 cfm; inlet pressure is 15.4 psig and discharge pressure 19.4 psig. The blower is driven by a De Laval 220 brake horsepower MCP Turbine operating at 300 psig with a temperature of 650 F; it has all labyrinth shaft packing for high back pressure service.

In addition to single stage designs, De Laval makes a complete line of equipment for all refinery services, including multi-stage compressors driven by De Laval multi-stage turbines for condensing, non-condensing and automatic extraction applications.

*Send for new Bulletin 0504*

**DE LAVAL** *Centrifugal Blowers*

DE LAVAL STEAM TURBINE COMPANY

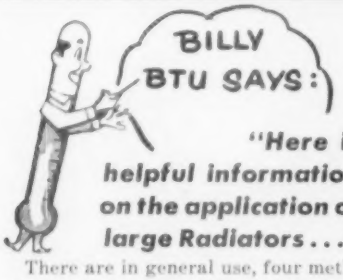
*810 Nottingham Way, Trenton 2, New Jersey*

DL 350

Young Heat Transfer News

YOUNG RADIATOR COMPANY, RACINE, WIS.

# Ford Dissipates Quench Oil Heat with Young Evaporative Coolers




***"Here is helpful information on the application of large Radiators . . ."***

There are in general use, four methods of cooling a large internal combustion engine with a Radiator.

The most common method is to use a single stream of water through a Radiator.

The second most common method is to use a portion of the Radiator to cool the lubricating oil directly.

The third most common method of temperature control is to use two separate streams of water each through a separate portion of the Radiator. One stream is engine jacket water, and the other is used through a shell and tube lubricating Oil Cooler.

The fourth method of cooling is used where one large Radiator must cool several engines of various makes or models. This method consists of cooling a single stream of water through the Radiator to a rather low temperature and passing this water through several shell and tube Coolers to cool the lube oil and jacket water for each engine in separate Coolers.

For further details, see Booklet offer below, or contact Young Radiator Company, Department 205-M, Racine, Wis.

Heating element wrapped around oil lines serving YEC.

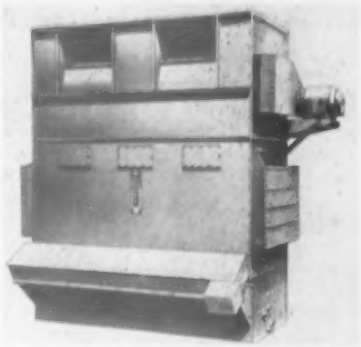
Rear view shows convenient observation ports.

## Transmission Plant's Heat Treat Operation Completely Automatic

Ford Motor Company's transmission plant, Livonia, Michigan, is equipped with two Young Radiator Company Evaporative type Coolers. Set up for completely automatic operation, the Young Coolers reject quench oil heat in the heat treating department. Because the cooling units are installed out-of-doors, oil lines are wrapped with heating elements and water lines are fitted with steam jets to prevent freezing in winter.

Young Evaporative Cooler moisture eliminators separate entrained water from the vapors and return water to the Cooler pumps. Thus, only vaporized water is lost by discharge in the air stream.

Versatile YEC Units meet a variety of cooling and condensing problems. By varying the basic design slightly, economical standard units can be adapted to cool engine jacket water, lubricating oil, natural gas, and condense steam, hydrocarbons and other gases . . . at operating pressures ranging from 100 to 2000 psig. For further details write for free Catalog No. 1952 to Department 205-M, Young Radiator Company, Racine, Wisconsin.



Rear view showing several access panels in all sections.

**RADIATORS FOR STATIONARY ENGINES BOOKLET AVAILABLE FOR DESIGN ENGINEERS**

A 16-page Booklet prepared by a leading Young Radiator Company design engineer discusses four methods of cooling internal combustion engines with a Radiator. Material includes schematic drawings, pictures and sample specifications. Price, 50¢. Write for Bulletin 2136 to: Young Radiator Company, Racine, Wisconsin.

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Creative HEAT TRANSFER ENGINEERS FOR INDUSTRY
Heat Transfer Products for Automotive, Aviation and Industrial Applications.
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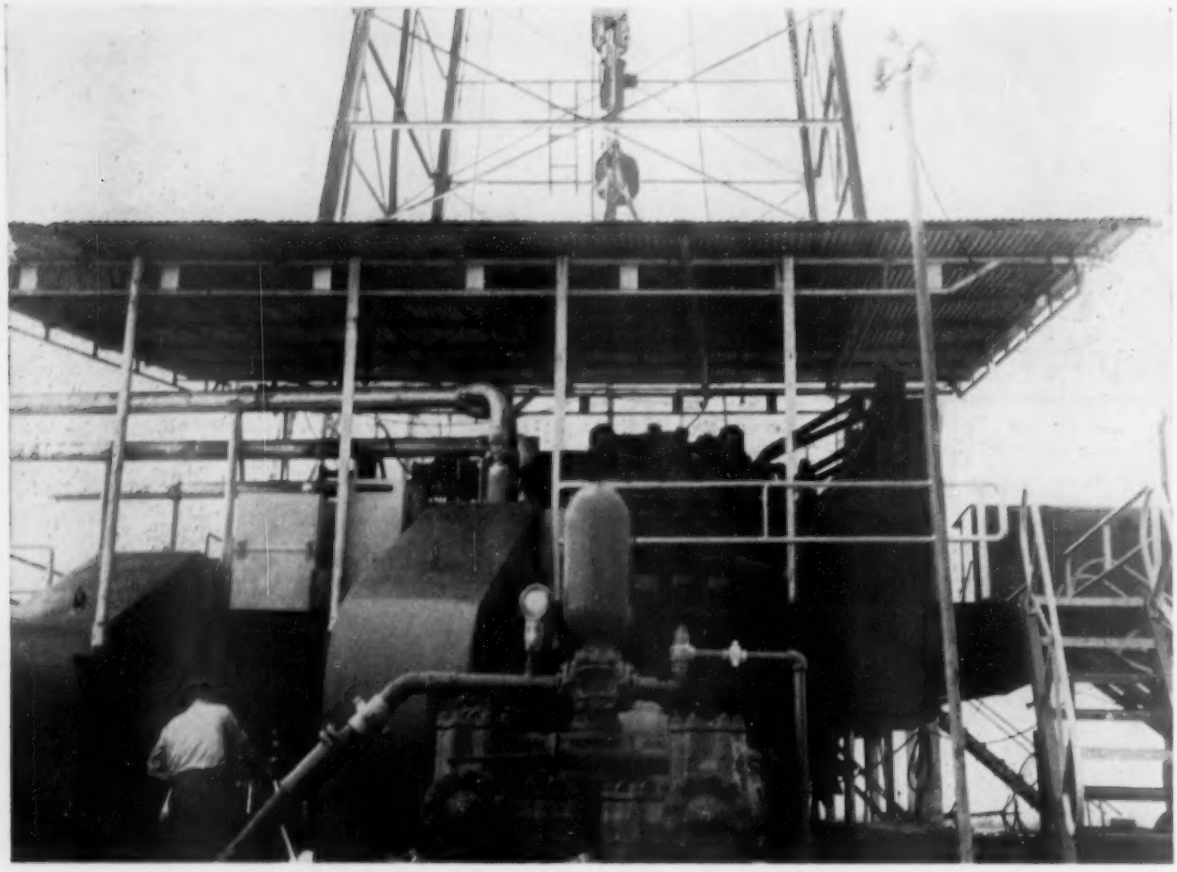
Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Matteon, Illinois



# *Deephole Drilling . . . In a Hurry !*

**. . . the acceleration, lugging power, and dependability you get from Le Roi L3460 and L4000 engines mean faster round trips and lower drilling costs.**

WHEN you have to go deep you need plenty of horsepower. And the place to get it is from Le Roi's L3460 with 600 max. hp. or its big brother, the L4000 with 655 max. hp.

You get much more, too. You get compactness. These V-12 overhead-valve engines are only 164 in. long. That makes them ideal for drill-rig installation, because they pack a lot of power in a small space — give you more horsepower per dollar.

But that's not all you get from these high-output engines. They represent the first, truly new design concept in 15 years. They have improved fuel economy; integral crankcase and cylinder construction for greater rigidity; longer bearing life; hydraulic valve lifters; better manifolding; husky crankshaft with integrally forged counterweights for unbelievably smooth operation — modern features that mean lightning response to load demands, outstanding performance and dependability.

Like all Le Roi engines, they're built to stand oilfield handling; they're easy to service; they have a wide speed range up to 1350 rpm; and they operate on natural gas, butane, or gasoline.

Ask your supply house or Le Roi distributor to show you an L3460 or L4000 at work. See for yourself why they can help you make hole faster. Literature is also available — just write us for it.

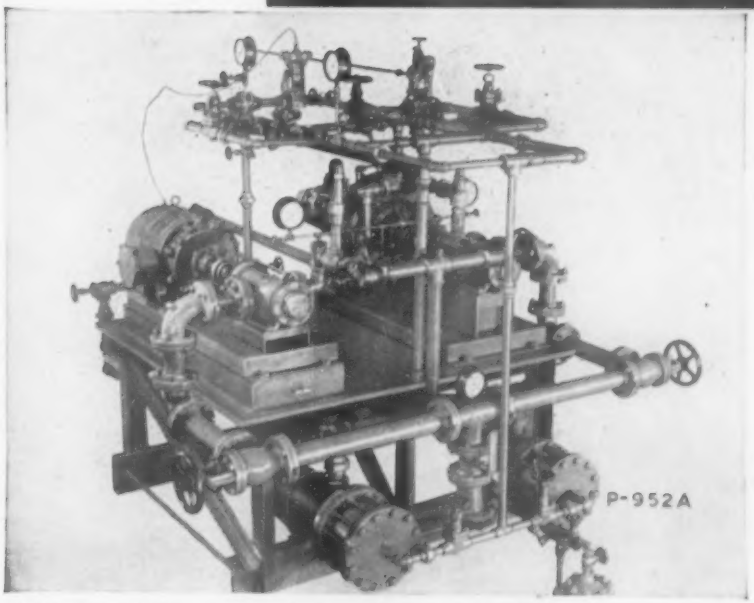
P-139

**LE ROI** *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS TRACTAIR STATIONARY AIR COMPRESSORS AIR TOOLS ENGINES

# complete range of sizes & models in both medium & high pressure types *MORE COMPACT THAN EVER*




P-952A—Steam Turbine and Electric Motor drive gives flexibility in this compact Model P-ES2H size No. 25 unit.

**NATIONAL AIROIL**

## FUEL OIL PUMPING and HEATING UNITS

NATIONAL AIROIL Fuel Oil Pumping and Heating Units are specially designed to prepare, for combustion, all grades of fuel oil including No. 6 or Bunker "C" Oil and residuums. They will draw fuel oil from above ground or underground tanks, preheat it to proper constant temperature and deliver it to Oil Burners at an even pressure, best suited for the burners. Our Fuel Oil Pumping and Heating Units are the result of years of experience. They come completely equipped ready for steam, exhaust, condensate, oil suction, oil return, and electrical connections. All valves, regulators, etc., are readily accessible. The piping arrangement is easily understood. These compact, space-saving units are available in a range of sizes and models in both Medium and High Pressure types. For complete details, write for our Bulletin 40 — very interesting and informative.

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GAS BURNERS
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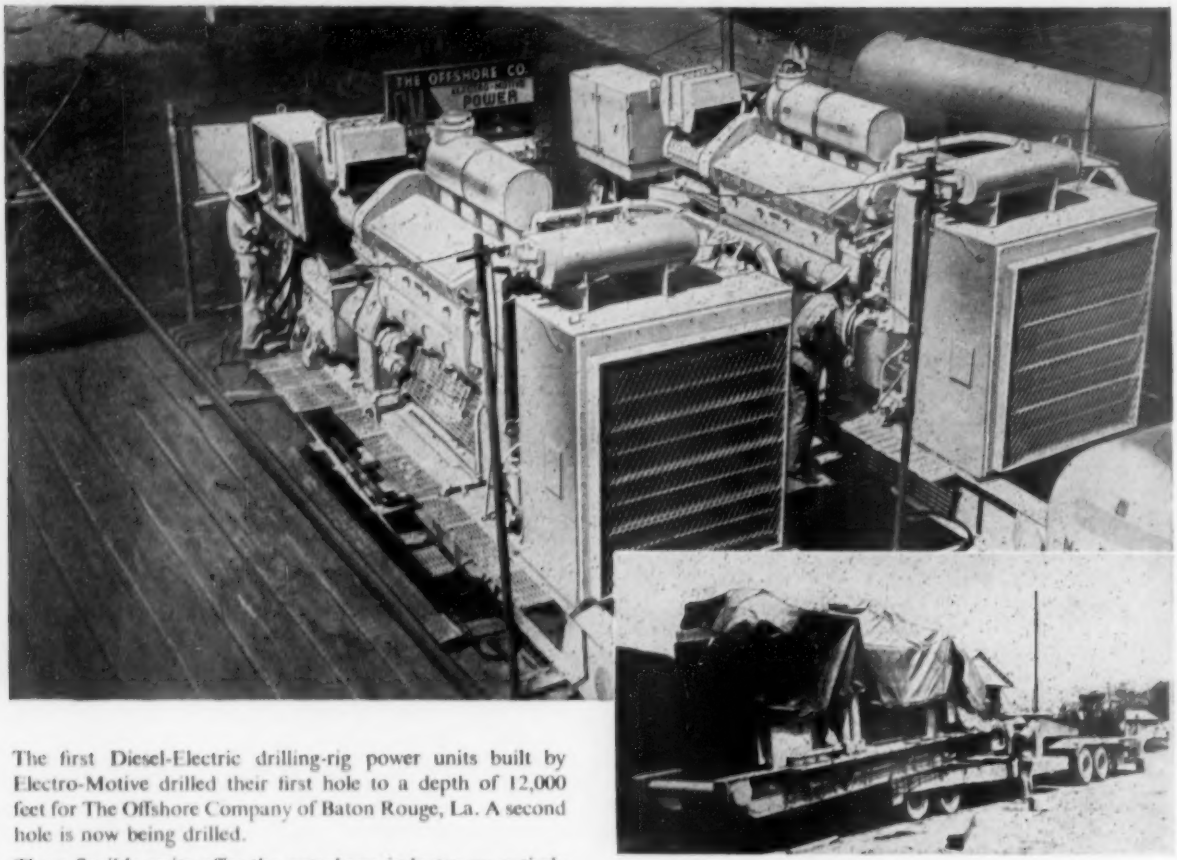
**INDUSTRIAL OIL BURNERS, GAS BURNERS, FURNACE EQUIPMENT**

# New Electro-Motive Drilling-Rig Power Plant Completes First Hole...for Offshore Company




*Maximum portability* of Electro-Motive Power Units is shown in this photo of skid-mounted 8-cylinder Diesel engine-generator set being delivered to Offshore Company drilling site near Houma, La.

The first Diesel-Electric drilling-rig power units built by Electro-Motive drilled their first hole to a depth of 12,000 feet for The Offshore Company of Baton Rouge, La. A second hole is now being drilled.

These flexible units offer the petroleum industry an entirely new concept in a Diesel-Electric drilling rig. A compact, lightweight package with all components engineered, built and backed by *one* manufacturer, the Electro-Motive unit features simplified control and rugged dependability at a cost far below that of previously built Diesel-Electric rigs and comparing favorably with Diesel-mechanical rigs.

Basic unit consists of eight-cylinder General Motors 567C two-cycle Diesel engine—developing 875 continuous horsepower—mounted on portable skid with two generators, generator control cabinet and engine cooling apparatus. Direct current electricity from the generators is supplied by cable to the 625-horsepower motors which, singly or in pairs, supply power for the mud pumps, draw works and rotary table.

**Unmatched Flexibility**

Power transmission cables are quickly and easily connected and disconnected with no bolting or taping required. Thus setup time is reduced to a minimum. Engine-generator units in land operation can be placed anywhere near the drilling site, with no need for heavy foundations or worry about alignment with mud pumps, draw works and rotary table as is required with mechanical rigs. In offshore operations, the advantage is that Electro-Motive power can be put into a minimum of space with important savings in high-cost deck area of barge.

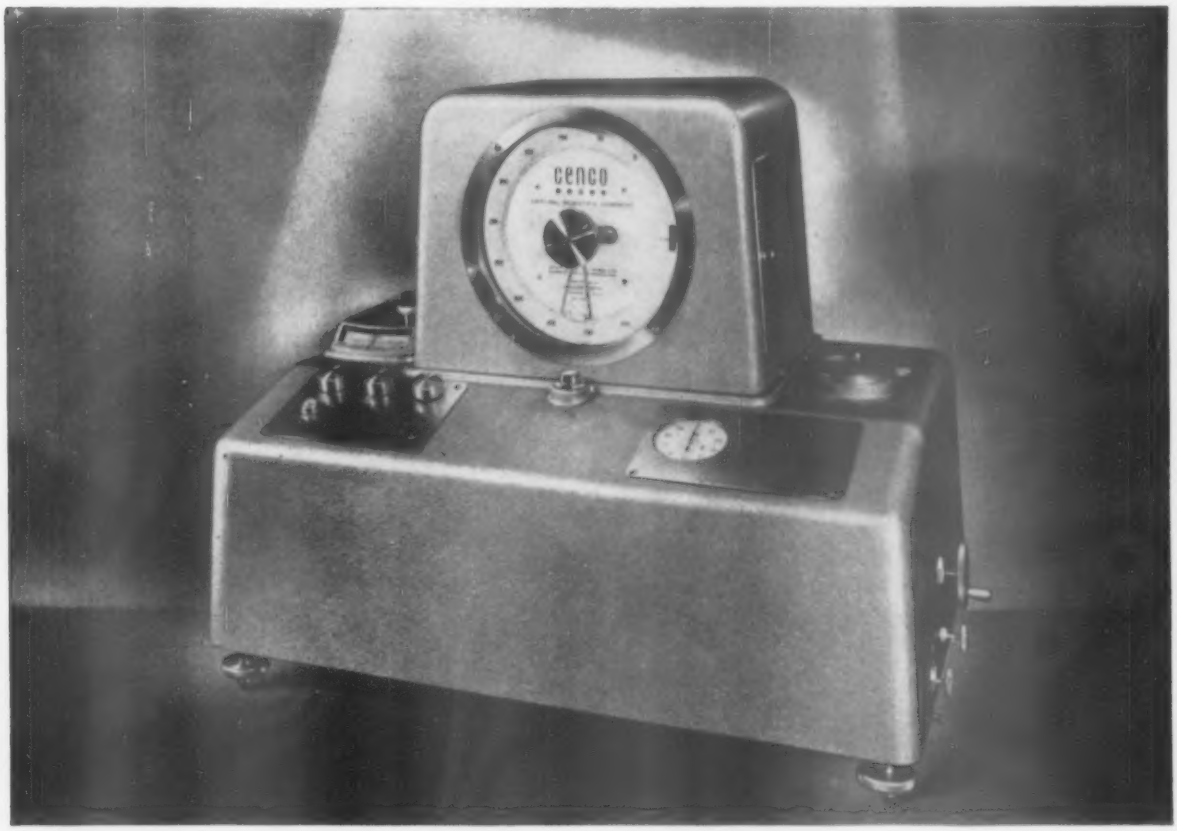
For further information, write or call your nearest Electro-Motive representative.

**Electro-Motive Division offices located in New York City, Chicago, Jacksonville, St. Louis, Tulsa and San Francisco.**

## ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *In Canada:* GENERAL MOTORS DIESEL, LTD., *London, Ontario*

**World's Largest Builder of Heavy-Duty Diesel Engines and Electric Traction Equipment**




# *For faster...more accurate measurement of percentage hydrogen in liquid hydrocarbons...*

## Cenco Beta Ray H/C Meter

This instrument utilizes the absorption of beta rays as a means of measuring the percentage of hydrogen, or the hydrogen-carbon ratio, in liquid hydrocarbons. It is a practical precision instrument designed for use in research as well as in product control and routine analysis. It is the fastest known means of obtaining this important information, doing the entire job in a matter of minutes instead of the hours required by combustion train methods.

The Cenco Beta Ray H/C Meter is accurate to within 0.02 weight percent hydrogen. Calibration is independent of pressure changes in ionization chambers since they share a common supply of gas. Temperature changes do not affect measurement since both specific gravity and beta absorption measurements are made automatically and at the same temperature. Adequate shielding makes the instrument safe from radiation hazards.

Our Bulletin No. 115 contains full details. Write for your copy today.

Manufactured and sold only by Central Scientific Company by arrangement with Standard Oil Company (Indiana).

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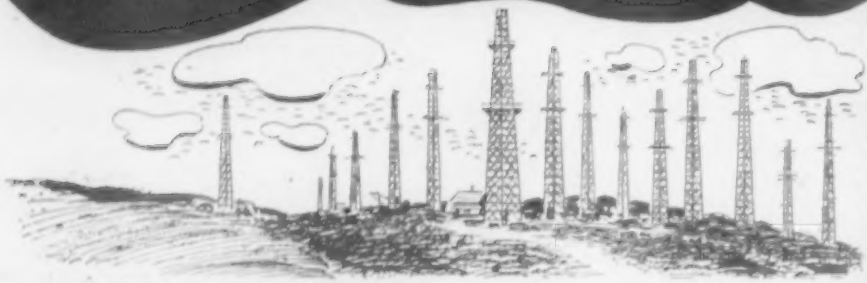
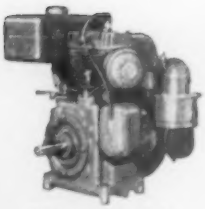
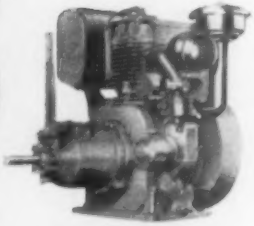
# Performance-Proved Field-Tested POWER...

## WISCONSIN HEAVY-DUTY Air-Cooled ENGINES

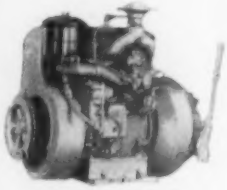




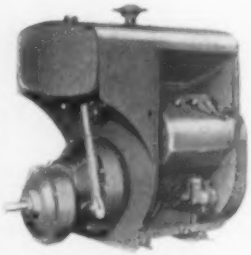
**Models ACN, BKN,**
4-cycle
Single Cylinder
2.3 to 6.8 hp.



**Models AEN, AFH, AGH, AHH** — 4-cycle
Single Cylinder
6 to 9 hp.



**Model TFPD Oil Well Pumping Engine**
8.3 to 13.2 hp.



**Models VE4, VF4, VG4D**
V-type, 4-cylinder
15 to 36 hp.

The fact that Wisconsin Air-Cooled Engines have been given such wide-spread and enthusiastic acceptance in the Oil Field is due to several good, solid factors:

**1** **Field-Tested.** Wisconsin-powered equipment is being tested constantly under actual operating conditions by the field staff of Harley Sales Company. Accurate service records determine the advantages and limitations of the units on test, thereby providing the customer with ultraconservative performance claims. The customer knows, in advance of purchase, what to expect . . . and usually his best expectations are more than fulfilled.

**2** **Performance-Proved.** Thousands of Wisconsin Heavy-Duty Air-Cooled Engines, ranging from the power-packed little ACN and BKN models to the husky VG4D V-type, 4-cylinder job, turning up 36 hp. at 2200 R.P.M., are delivering hard-hitting, dependable power every day, under all conceivable operating conditions. "Most H.P. Hours" of performance-proved service provides tangible evidence of Wisconsin Engine stamina and economy.

**3** **Sellers' Service.** As primary oil field distributors, the Harley Sales Company has full recognition of the need for prompt delivery of equipment and parts and maintains exceptionally large warehouse stocks. Orders for parts are handled the same day they are received.

**4** **Manufacturer's Responsibility.** As the world's largest builders of heavy-duty air-cooled engines, the Wisconsin Motor Corporation has a responsibility both to the *seller* and *user* that is fully met and sustained to the limit of our ability.

All this adds up to the kind of a deal that pays off for the power user in terms that are most satisfactory to him.

*Wisconsin-Powered Oil Well Pumping Unit . . . Single cylinder Wisconsin Engine operating a Gaulds' Reciprocating Pump in Oklahoma Little Chief Field.*

**WISCONSIN MOTOR**
**Corporation**
**MILWAUKEE 46, WISCONSIN**
*World's Largest Builders of Heavy-Duty Air-Cooled Engines*

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*Hydraulically Controlled*

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*The first basic improvement for loading and unloading of petroleum products in over 30 years.*

- Speeds tanker turn-around-time
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- No manhandling of hose

**CHIKSAN COMPANY; Brea, California**

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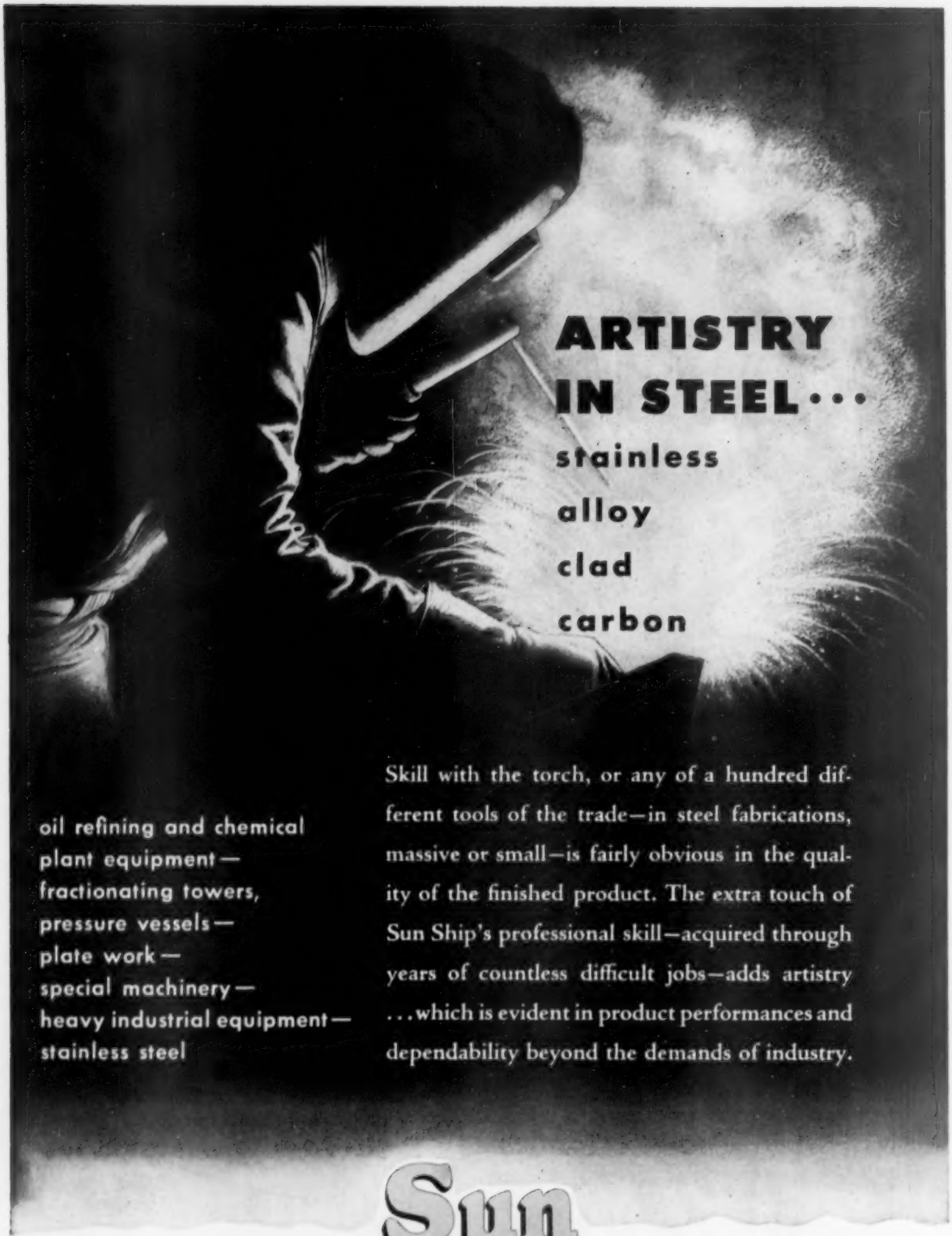
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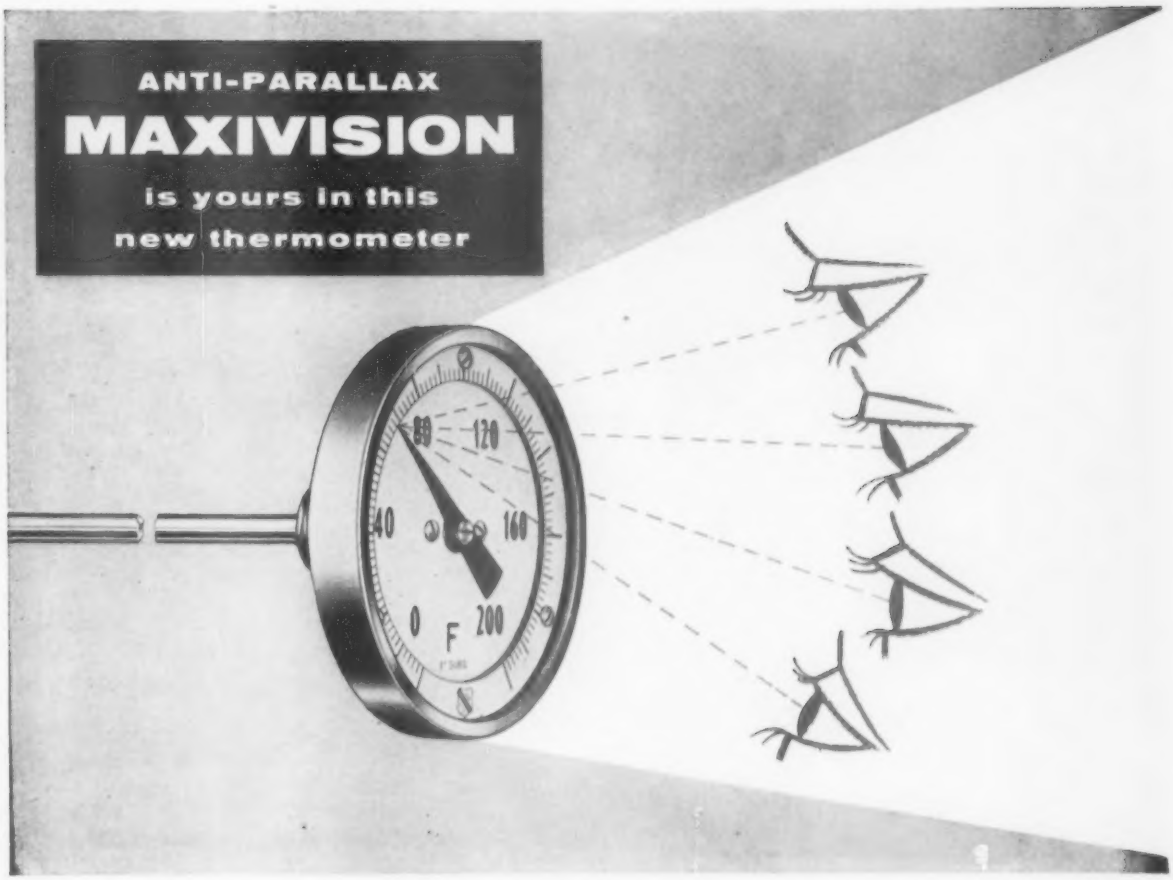
ANTI-PARALLAX

# MAXIVISION

is yours in this new thermometer




Now you can read temperatures *right at the process* with the same ease, accuracy and economy as pressure readings. The Anti-Parallax Maxivision Dial on this new all stainless steel American Bi-Metal Thermometer assures these important advantages. The large, easy-to-read black figures and graduations are carried on a raised ring set close to the glass, with pointer at the same level. Parallax error is practically eliminated.

With this new thermometer in service, field operators can eliminate frequent trips to the control house to observe process changes. Indoors or outdoors, this fine, all stainless steel American instrument is truly climate-proof. Because the case is only 3" in diameter, the thermometer fits where space is limited. Ample clearance behind the case makes installation easy and fast with a small wrench. Read the specification highlights, then get full details about this new high-accuracy American Bi-Metal Thermometer.

**PHONE your Industrial Supply Distributor** for prompt attention to your needs. He is always ready to help keep your production going by making fast delivery from local stocks.

## SPECIFICATIONS

**New AMERICAN ALL-STAINLESS STEEL BI-METAL THERMOMETER with ANTI-PARALLAX MAXIVISION DIAL**

**Dial:** Exclusive anti-parallax Maxivision dial, with scale approximately 6" long. Pointer set at same level as scale.

**Climate-Proof Case:** All stainless steel. 3" diameter. Threaded bezel. Selected clear, extra-heavy cover glass. Heat-resistant gaskets between glass and case seal the thermometer against rain, frost, sand, dust, fumes—climate-proof.

**Temperature Ranges:** From minus 80° to plus 1000° F. Accuracy within 1% of range.

**Low-Mass Bi-Metal Coil:** Welded to stem plug. Accurately centered in stem. Non-freezing, non-corrosive silicone fluid on coil dampens vibration, accelerates heat transfer, speeds response; does not gum, resists capillary action.

**Pointer:** Index type. Easily accessible from front of dial for positive adjustment over entire range. Pointer shaft guided by friction-free bearings.

**Stem:** 18-8 stainless steel, mirror polished. All joints welded. Resists corrosion. Provides strong, rigid and tight closure against process pressures. Lengths: 2½" to 24".

**Connection:** Fixed, ½" N. P. T.

**Separable Sockets:** Available for use in closed systems or where measured medium is corrosive to the stainless steel stem. Fit over all standard stem lengths except 2½".

# AMERICAN INDUSTRIAL INSTRUMENTS

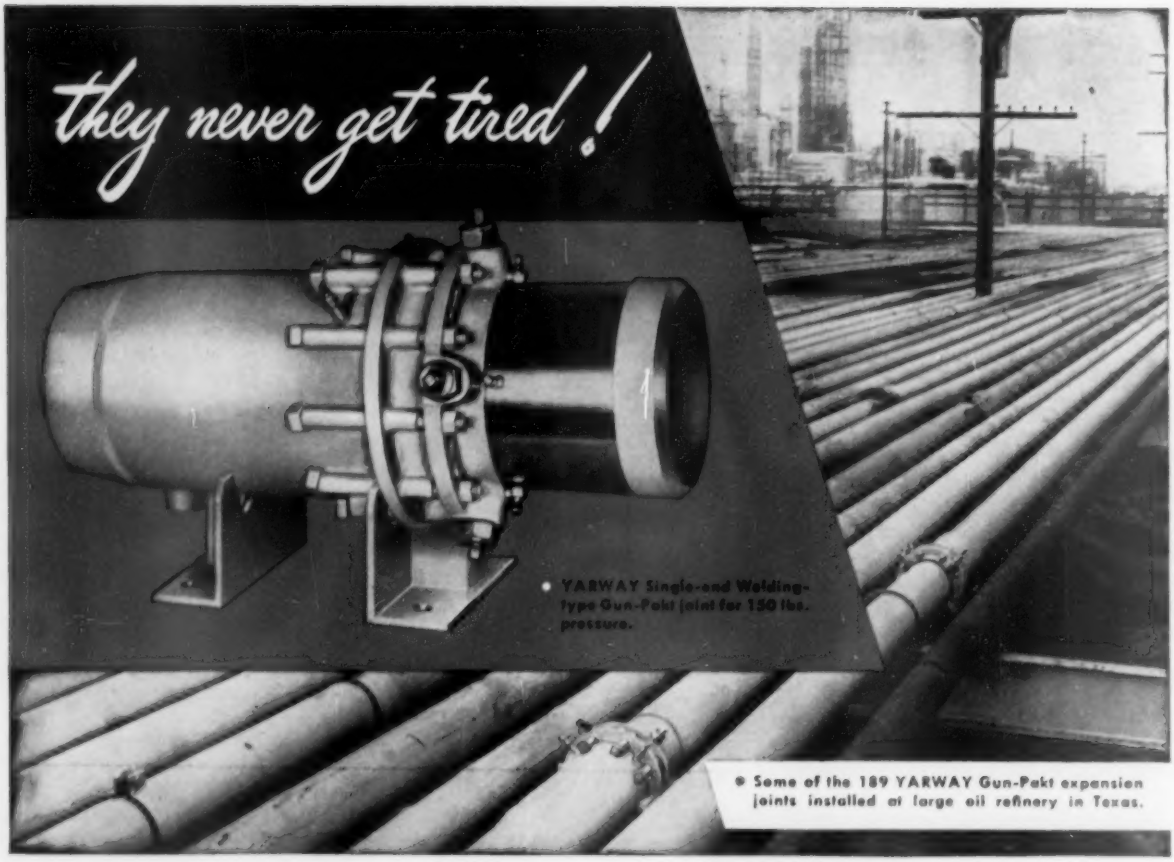
A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'AMERICAN MICROSEN' INDUSTRIAL ELECTRONIC INSTRUMENTS, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, *Stratford, Conn.* HANCOCK VALVES, *Watertown, Mass.* 'CONSOLIDATED' SAFETY RELIEF VALVES, *Tulsa, Oklahoma.* AIRCRAFT CONTROL PRODUCTS, *Danbury & Stratford, Conn. and Inglewood, Calif.* "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES, *Muskegon, Mich.*

*they never get tired!*



• YARWAY Single-end Welding-type Gun-Pakt joint for 150 lbs. pressure.



• Some of the 189 YARWAY Gun-Pakt expansion joints installed at large oil refinery in Texas.

# *No fatigue* with 189 YARWAY GUN-PAKT EXPANSION JOINTS at this large Texas refinery

THEY just work and work for years and never get tired. Yarway Gun-Pakt slip-type joints simply will not fail through fatigue. They will operate smoothly, as frequently as required, over long, full traverse up to 12" single type or 24" double type or short, partial traverse, day in and day out—with never any danger of metal fatigue or failure.

This is just one of the many big advantages found in Yarway Gun-Pakt expansion joints. Other outstanding Gun-Pakt features are:

1. Can be serviced under *full* steam pressure day and night, thus avoiding costly and inconvenient shutdowns.
2. Fixed Gun-Pakt gland serves as "built in" external guide and permits less costly and rigid pipe guidance than required by many other types of joints.
3. Lower pressure load on end anchors because excessive strains are eliminated.

Used for many years with success in well-known refineries, industrial plants, utilities and institutions. When replacing present joints or planning new steam lines, it will pay you to look into the advantages of the Yarway Gun-Pakt expansion joint. Write for Yarway Bulletin EJ-1913.

**YARNALL-WARING COMPANY**
136 Mermaid Avenue, Phila. 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

YARWAY

**gun-pakt expansion joints**

# PEERLESS SEPARATORS

## ALL 9 OF 'EM!

## PEERLESS OIL and GAS SEPARATORS ARE PERFECT ... for Pipelines, gathering systems, compressor stations or as INLET SEPARATORS in refineries and petrochemical plants.

NINE big Peerless 24" x 6', 230-lb. pressure Separators, all doing an efficient job of separation of liquids from gases at engine room of main line booster station in West Texas. This is typical of the many successful applications of Peerless Separators.

Each Peerless Separator is designed and built around the famous Peerless Mist Extractor Unit, which guarantees the liquid entrainment loss to be less than 1/10 gallon per million standard cubic feet of flowing gas. The cutaway to the right illustrates the flow of gas through a Peerless Separator and how this Mist Extractor is used.

1. INLET BAFFLE utilized for maximum primary separation.

2. The famous Peerless MIST EXTRACTOR UNIT.

The green arrows indicate the flow of solids and bubbles indicate the gases.

*Write for Separator Bulletin 201*

PEERLESS MFG. CO.

**PEERLESS MANUFACTURING CO.**

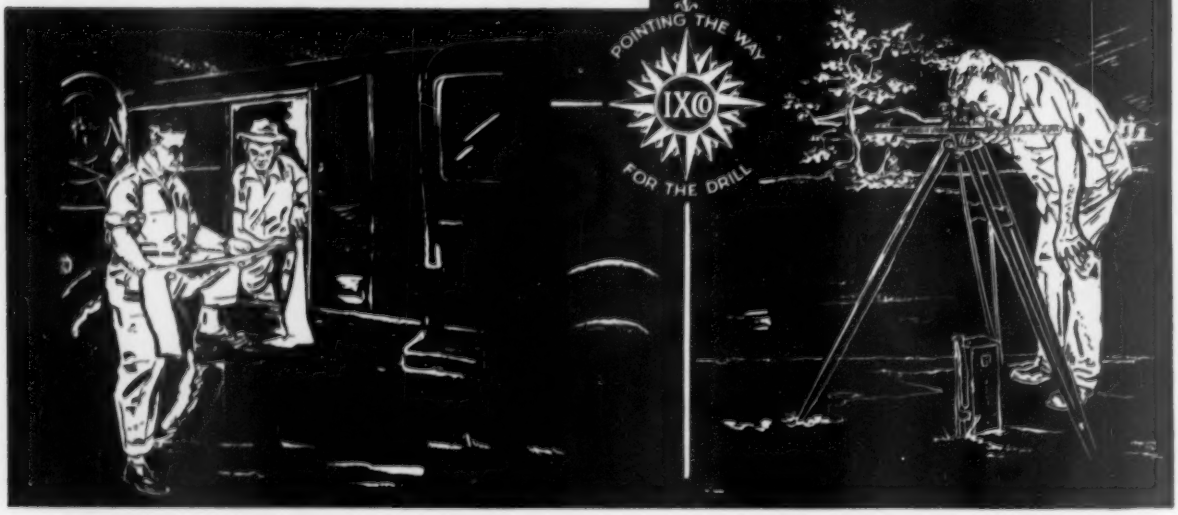
P. O. BOX 13165 ★ DALLAS 20, TEXAS ★ DIXON 8431

*REPRESENTATIVES IN ALL PRINCIPAL CITIES*

It's a long, long way from the bottom of a surveying party to the top man position. However, B. B. Robinson, Jr., like so many other IX personnel, started as a surveyor with a party over 20 years ago . . . worked up through the jobs of observer, computer, and party chief to his present position of supervisor and manager of IX's Fort Worth office.

# DERRICKS TODAY

## Where I.X. Parties Were Yesterday




No seismographic survey party picks up its know-how overnight – it takes years of intensive field work . . . years of working together . . . before a party can be depended on to turn in a fast and accurate survey. That's where Independent Exploration parties come out on top – they're staffed with the know-how that comes from experience. These parties know the shortcuts that save time and money without sacrificing accuracy – employ these shortcuts to *your* advantage. Enlist this invaluable extra on your *next* survey – call on IX for a better job.

# Independent

## EXPLORATION COMPANY

*Geophysical Surveys*

1973 West Gray, Houston, Texas

39 Victoria St., London, SW 1, England

208 Dominion Bank Bldg., 8th Ave. & 1st St., East, Calgary, Alberta, Canada

IN THE OIL INDUSTRY, TORRINGTON *Bearings are used in many applications including slush pumps, rotary tables, draw works, blocks, swivels and pumping units.*

*Courtesy of the Ohio Oil Co.*

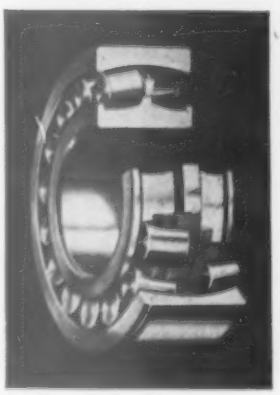
# TORRINGTON Spherical Roller Bearings

*are designed with machined, cast-bronze, land-riding cages—one for each path of rollers—to assure true rolling operation*

Other TORRINGTON SPHERICAL ROLLER BEARING features are equally important in assuring top performance. Contact surfaces are precision ground for even load distribution, long bearing life. Rollers and races are carefully heat treated to give maximum resistance to shock and wear.

An integral center flange gives positive radial stability and accurate positioning of thrust loads—an essential factor for longer service life. Contact surfaces possess geometrical conformity, giving ultimate load carrying capacity.

These are reasons why TORRINGTON SPHERICAL ROLLER BEARINGS give you long, low-maintenance service in the toughest, heavy-duty applications. Get the most for your bearing dollar—specify TORRINGTON.



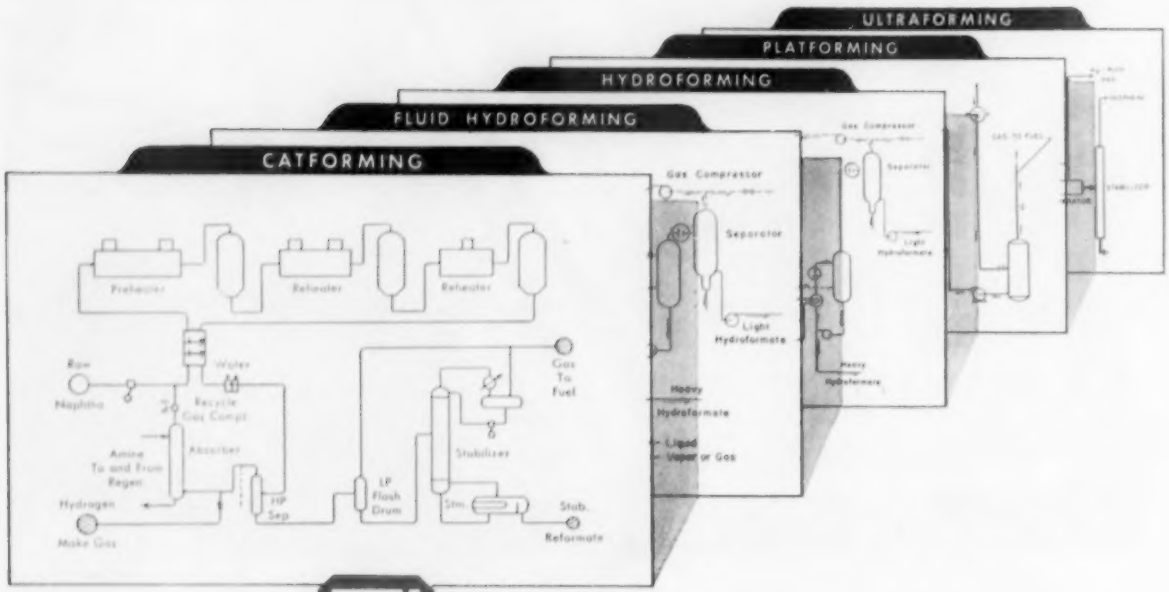
THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.

*District Offices and Distributors in Principal Cities of United States and Canada*

**TORRINGTON SPHERICAL ROLLER BEARINGS**

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

# which method of
# CATALYTIC REFORMING
## is best suited to your needs
# ...FLUID or FIXED BED?




## Here's why FW can give you the right answer

### ...and supply the complete job, too!

The success of catalytic reforming has led to the development of many different methods — both fluid and fixed bed. Selection of the most economical and efficient process for any given installation therefore poses an interesting problem.

Foster Wheeler has completed an extensive economic study of the relative values of the fluid method of catalytic reforming versus the various fixed bed methods. It was found that each has its merits . . . and its limitations. Proper selection depends on plant size, quality of charging stock, octane requirements and other factors.

Our wide design, engineering and construction experience in both fluid and fixed bed catalytic reforming is at your service. *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

# FOSTER WHEELER

Rugged Chicago Pneumatic Three Cone Rock Bits are designed to afford deep penetrating action with every turn of the drill stem. Their fast cutting speed enables you to drill more feet a day. They're available in seven different types from soft to exceedingly hard and abrasive formations. *Oil Tool Division, Chicago Pneumatic Tool Company, 5000 U. S. Highway 81 South, Fort Worth, Texas.*

# Chicago Pneumatic

*GENERAL OFFICES:* 8 East 44th Street, New York 17, N. Y.
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THREE CONE BITS • REAMING BITS • REAMERS • DRILL COLLARS • TOOL JOINTS • SUBS • JUNK BASKETS

# NOW! Brand-New Extinguishers Make Kidde Line *Most Complete!*

**Efficient, dependable and superior in design, the new *expanded* line of Kidde extinguishers now makes it easier for you to choose the *right* extinguisher for every fire hazard!**

1. **Water and anti-freeze.** Now available either air-pressurized or cartridge-operated, in either brass or stainless steel, 2½ gallon capacity.

2. **Pump tanks.** 2½ and 5-gallon sizes, in either galvanized or polished copper tank. Removable all-brass double-action pump throws 40-foot stream.

3. **Dry chemical.** Air-pressurized in 5 or 10-pound capacities, cartridge-operated in either 20 or 30-pound portables. 150-pound capacity wheeled unit for large hazards.

4. **Carbon dioxide.** Portables in 2½, 5, 10, 15 and 20-pound capacities, in either trigger or squeeze-valve models. Also wheeled units in single-cylinder capacities of 50, 75 and 100 pounds.

5. **Vaporizing liquid.** CTC or CBM, pump or air pressure operation with seamless drawn brass shell. Pump capacities 1 to 1½ quarts, pressurized capacities 1 and 1½ quart or 1 gallon.

6. **Foam and soda-acid.** Seamless drawn brass or stainless steel shell, in 2½ gallon size. Also available: 40-gallon soda-acid and foam wheeled units.

For more information on these and other extinguishers in Kidde's new expanded line, write today for the new Kidde P-8 catalog.

**Walter Kidde & Company, Inc.**
**1254 Main Street, Belleville 9, New Jersey**
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The words 'Kidde', 'Lux', 'Lux-O-Matic', 'Fyro-Freez' and the Kidde seal are trademarks of Walter Kidde & Company, Inc.

# WHAT IS A WICKWIRE ROPE DISTRIBUTOR?

- He's quality people...handling quality products.
- He knows the local industries he serves, and he knows wire rope.
- He solves your wire rope problems. His own first-hand knowledge and experience are backed up by the technical assistance of Wickwire Sales Engineers.
- He brings you Wickwire Rope and Slings at the lowest possible cost, because he spreads his sales and distribution expense over the hundreds of related items he carries.
- He stocks exactly what you need, saving you time, paper work and storage space.
- He's a good man to know. Buy your Wickwire Rope and Slings from him. You'll find that the many valuable services he offers far outweigh any apparent price advantage you might gain by buying direct.

CF&I WICKWIRE ROPE A CF&I PRODUCT

A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION

3149

**Runs fracturing pumps**

# *Smooth as Steam*

## SAVES $1100 A MONTH PER UNIT

Producers Chemical Company of Borger, Texas, eliminated an auxiliary clutch and transmission—and saved $1100 a month in replacement costs—by converting a hydraulic fracturing unit from mechanical drive to Allison TORQMATIC DRIVE in June 1954.

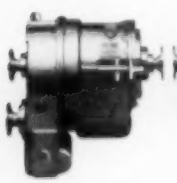
Job-time per well was cut by 15% while fuel costs dropped 20%. And the TORQMATIC DRIVES brought in new customers.

With savings like that, Producers was quick to convert a second unit in July and a third unit in August.

Producers Chemical Station Manager Jay Mays says his TORQMATIC-equipped units are "faster, stand up better, give steadier pressure and more sand-oil input into each well." He says he's standardizing on Allison TORQMATIC DRIVES for his hydraulic fracturing and big well-acidizing units.

Today there are over 200 Allison TORQMATIC DRIVE hydraulic fracturing units working in the oil fields. The TORQMATIC Converter-Transmission teams transmit engine power *smooth as steam*, give steadier pressure in the hole. The TORQMATIC Transmission *quick-shifts* at full throttle for instant changes in pressure and volume—helps operators fracture wells surer, faster, better.

Get full details on Allison TORQMATIC DRIVES for drilling, servicing and fracturing equipment from your dealer, equipment manufacturer or write direct to Allison Division of General Motors, Box 894R, Indianapolis 6, Indiana.



GM TORQMATIC *Allison* **TORQMATIC DRIVES**

# HOW'S THIS FOR OS&D HOSE PERFORMANCE?

Tanker loading conditions are particularly severe at the Union Oil Company's Port San Luis Wharf, Avila, California. When heavy seas are running, tankers must be held some 75' to 100' away from the dock with the aid of four heavy mooring buoys plus the ship's anchor. In spite of these conditions, Hewitt-Robins Smooth Bore Oil Suction & Discharge Hose performs with maximum efficiency.

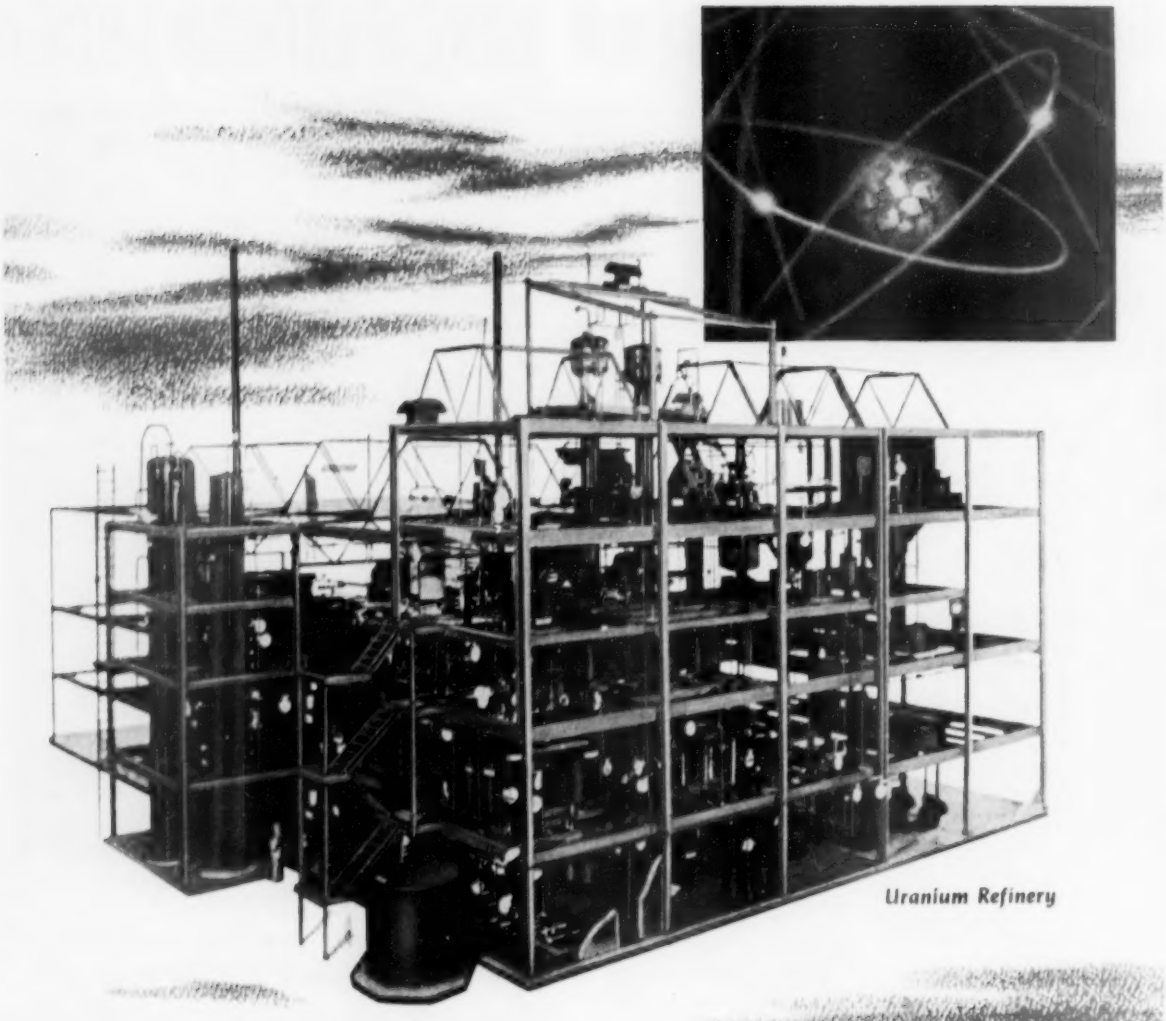
Normal life expectancy for loading hose at this installation is 15,000,000 barrels, yet a single line of Hewitt-Robins Smooth Bore OS&D Hose has handled over 37,000,000 barrels to date. Here again, a customer's performance record has shown that for longer hose life and more economy in operation the first and best choice is Hewitt-Robins Hose.

*For immediate information regarding Hewitt-Robins OS&D Hose or any Hewitt-Robins industrial hose contact your local Hewitt Rubber Distributor (See "Rubber Products" Classified Phone Book.)*

**Hewitt-Robins**

Conveyor Belting—Conveyor Machinery—Industrial Hose—Vibrating Screens—Vibrating Conveyors—Design, Manufacture, Engineering and Erection of Complete Bulk Materials Handling Systems.

HEWITT-ROBINS INCORPORATED • STAMFORD, CONNECTICUT



*Uranium Refinery*

## MODEL for Tomorrow

**The full scale commercial uranium refining plant—of which this is a model—is now under construction at Port Hope, Ontario, and will be completed in 1955, the first of its kind in Canada. With engineering and construction by Catalytic, it will make available to Eldorado Mining and Refining, Limited (a Crown Company) the most advanced processes for uranium refining. This new example of our services in advancing uranium technology portrays Catalytic's position of leadership in the industry of tomorrow. We welcome your inquiries today —that Catalytic's on-time, on-budget services may contribute to your success of tomorrow.**

**CATALYTIC ON-TIME...ON-BUDGET SERVICES**
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# SERVICE-ABILITY

When you call Tretolite for service, you get it — fast. This ability to provide effective service is dependent on many factors. It requires trained personnel, strategically located and adequately equipped. It necessitates the provision of dependable, fast transportation.

At Tretolite we believe we have the men and facilities to provide the best demulsifying and corrosion control service obtainable. We hope you will prove this to your own satisfaction. Just call the Tretolite service engineer in your area — you'll get service, fast.

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369 Marshall Avenue, St. Louis 19, Missouri
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**How to protect piers against corrosion using Monel-sheathed H-beam sections**

1. Drive piling close to final footing, leaving end above water.
2. Weld on Monel-sheathed section and complete driving.
3. Use paint above and sacrificial anodes below to protect the rest of the sub-structure.

# New Monel-sheathed section can boost life of H-beam piling

***Now, inshore docks and piers have same protection as offshore structures against corrosion in critical splash zone***

Offshore drilling structures point the way.

In the critical zone for corrosion, the splash zone, (from mean tide level to a few feet above prevailing wave crests), Monel* sheathing is proving highly effective in preventing corrosion of *tubular* support members. Witness many Gulf installations and the first Radar Detection Station off Cape Cod.

Now this Monel nickel-copper alloy protection extends to *H-beam* piling. Now you can give sub-structure on new docks and piers the same high life expectancy as offshore structures. A new Monel-sheathed H-beam section makes this possible.

### How Monel-sheathed section is installed

No special equipment is needed to construct pier and dock sub-structures with the extra protection of this nickel-copper sheathed structural element.

Ordinary H-beam piling is driven close to final footing and, if necessary, cut off slightly above the water level. Then the Monel-sheathed section is welded on and driving continued to final footing. Should the final elevation of the deck so indicate, additional sections of ordinary H-beam piling may be welded on top of the Monel-sheathed section.

### How to get Monel-sheathed H-beam sections

Pre-fabricated Monel-sheathed H-beam sections are now available from a number of concerns. Their names and detailed information on corrosion protection by this method will be supplied on request. Just contact M. B. Hunter.

**The INTERNATIONAL NICKEL COMPANY, Inc.**
67 Wall Street New York 5, N. Y.

INCO Nickel Alloys

**Monel**...*for minimum maintenance*

*Registered trademark

Photo courtesy of E. W. & A. P. Dupont, Inc., Morgan City, La.

### Standard Monel-sheathed H-beam section

This new type structural is available as a standard H-beam section 11 feet long (other lengths can also be supplied as desired). It is sheathed with Monel over 10 feet. Six inches of bare steel is left unsheathed at each end of the section and edges are prebeveled for welding.

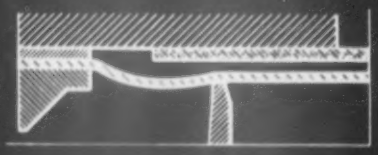
# FREEZING WEATHER NO PROBLEM

## TO S&J "TITE SEAL"

The Shand & Jurs "Tite-Seal" Breather Valve scoffs at freezing winter weather conditions. Its unique pliable diaphragm-pallet is the answer. When supplied with a special diaphragm of Teflon coated fiberglass for extreme freezing hazards, it has been found that only ¼" of water beyond normal valve setting was required to break ice. This has been determined by impartial tests conducted by laboratories, government agencies, and by independent research organizations.

For moderate climatic conditions, the S&J "Tite-Seal" is supplied with a pliable, reinforced synthetic rubber coated diaphragm. This design provides the tightest possible seal through a novel balancing action. When venting, a peeling action between the pallet and the seat overcomes sticking or freezing to a very marked degree. The "Tite-Seal," designated by S&J as Fig. ST-7575, will provide maximum venting dependability for petroleum tanks, no matter what the weather conditions.

The S&J "Tite-Seal" in action: Typical pallet with pliable diaphragm shown. In operation, tank pressure is directed through a port in the diaphragm to a chamber outside the periphery of the seat but inside the periphery of the pallet, producing a slight ballooning which effects a perfectly "Tite-Seal" at all pressures below that for which the pressure pallet of the breather valve is set to open.



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Whessoe, Ltd., Works: Darlington, County Durham

**TWENTY-FOOT LENGTHS** of 10" I.D. copper tubes receive final inspection in one of the mills of The American Brass Company. ANACONDA Seamless Drawn Copper Tubes are made up to 26" I.D.

# Anaconda Copper Tubes install easier . . . last longer

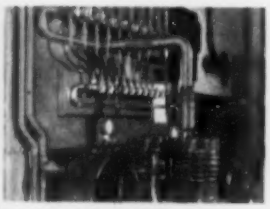
Planning a new installation? Want to replace unsatisfactory piping? Then look into the performance advantages of ANACONDA Copper Tubes *first*. Many plants have found them the best all-around piping material available.

*Here's why:* ANACONDA Copper Tubes are light. They come in long lengths. Smaller sizes are bent right on the job. All this means big savings on installation costs. And copper tubes can't rust. They resist corrosion and guard against contamination. Smooth interiors mean smoother flow. Pumping costs are often lower.

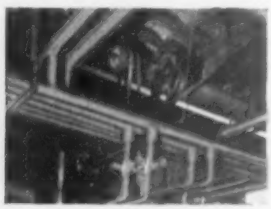
*Here's another advantage.* ANACONDA Copper Tubes – connected with solder-type fittings – can be taken down, moved or have new connections cut in faster than with threaded pipe. *You can meet changing plant conditions easily.*

If we can be of assistance in solving a piping problem in your plant please write to: *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Limited, New Toronto, Ont.*

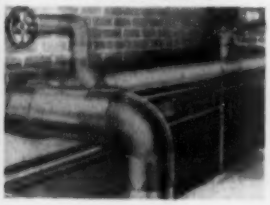
**Use Anaconda Copper Tubes for:**



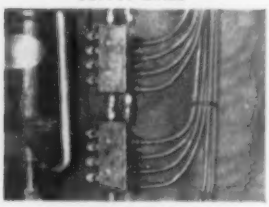
REFRIGERATION AND AIR CONDITIONING



HOT AND COLD WATER SUPPLY LINES



INDUSTRIAL HEATING LINES



AIR, LUBRICATING AND HYDRAULIC LINES

**for copper piping call an**

**ANACONDA®**

**Distributor**

# Wherever you are, the DRESSER PLUS assures special service

"One for all and all for you – the customer" is the practiced philosophy of all Dresser operating companies.

Wherever you are, whenever you do business with any Dresser unit, the combined technical knowledge, experience, and vast resources of the entire Dresser group is at your command. Dresser is a group of companies under a common ownership organized to better serve your interests.

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*To maintain close personal contact with our customers, Dresser operates worldwide.*

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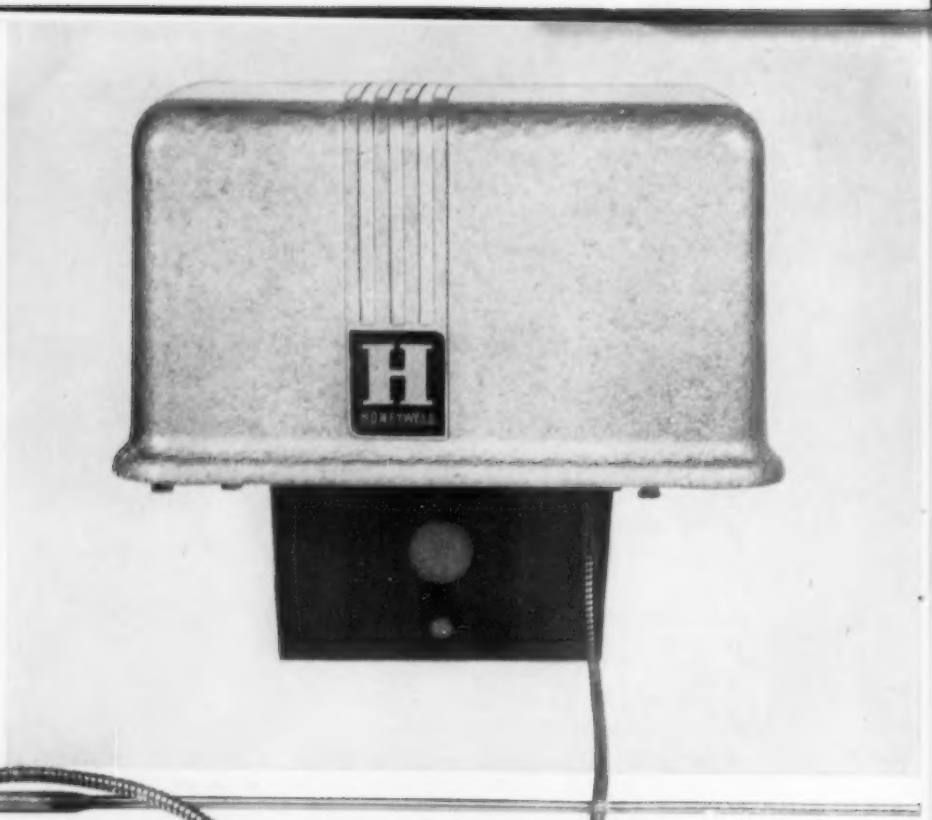
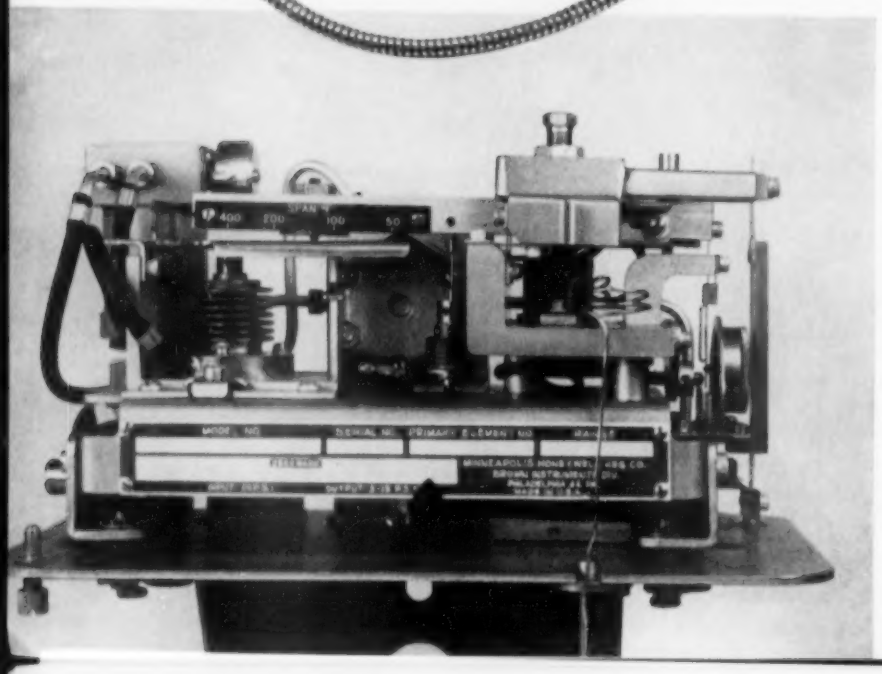
The *Tel-O-Set transmitter is housed in a rugged, weather-resistant case, only* $6\frac{1}{2}$" *by* $11\frac{3}{4}$" *by* $6\frac{3}{4}$". *It is readily mounted in the field . . . on pipe, wall, or horizontal well.*




*Interior view of the transmitter with cover removed shows the simple, sturdy force-balance mechanism. Span and zero adjustments are easily accessible . . . require no changes of parts.*

# Compare it!

## The same *Tel-O-Set* Transmitter can be used for temperature, absolute pressure or gage pressure–in all ranges

Changeover is simple...takes little time and labor. And, there's no need to stock an assortment of thermal systems or spring assemblies.

### Tops in performance, too . . .

In accuracy • In speed of response • In ambient temperature and pressure compensation • In resistance to vibration • In durability • In ease of adjustment and calibration • In operating economy

Span can be adjusted to any values between 20 psi or 50 F minimum, and 150 psi or 400 F maximum. Without changing parts, the span can be shifted to cover any part of the overall transmitter range . . . from −375 to + 1000 F, or from 40 to 550 psi.

This multi-purpose instrument will simplify the training of your operating and maintenance men . . . reduce spare parts inventory. And a single instrument does double duty as a standby replacement for either temperature or pressure applications. Its sturdy, corrosion resistant mechanism assures long service life.

Your local Honeywell sales engineer will be glad to discuss how the *Tel-O-Set* transmitter . . . and related *Tel-O-Set* miniature indicators, recorders and controllers . . . can work for you. Call him today . . . he's as near as your phone.

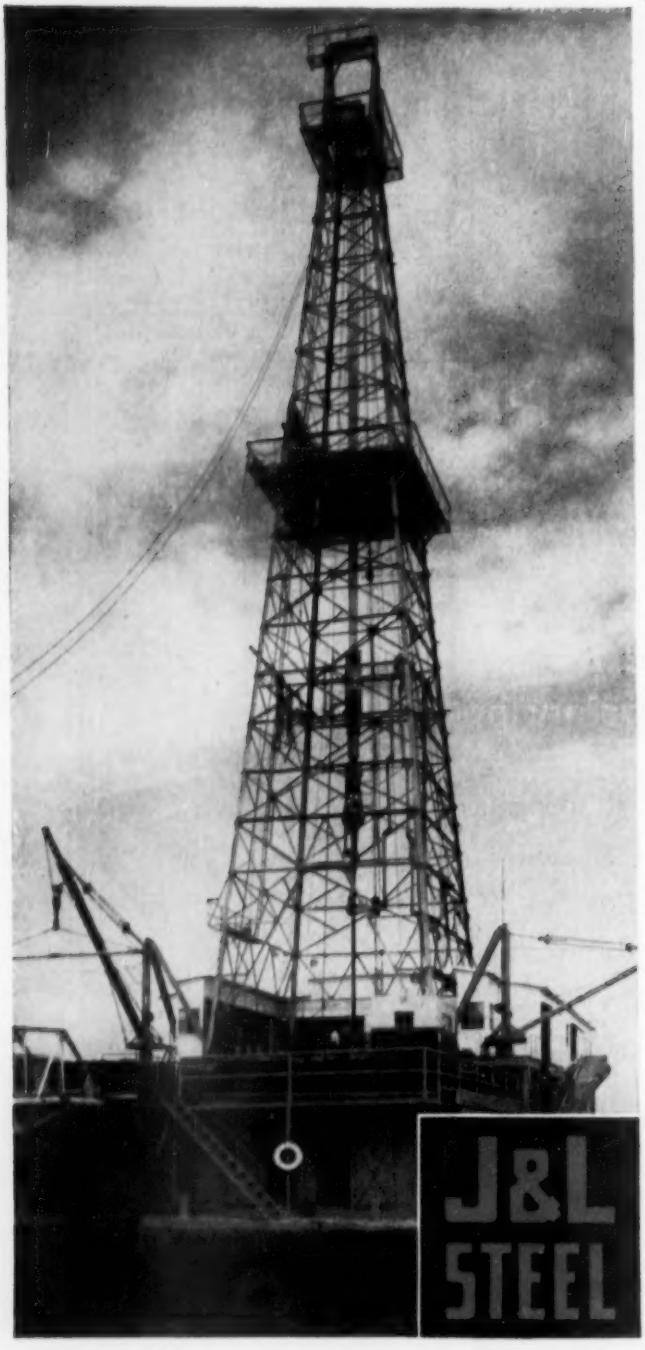
MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● **REFERENCE DATA:** Write for Bulletin 7280, "*Tel-O-Set* Transmitters."

MINNEAPOLIS
**Honeywell**
BROWN INSTRUMENTS

*First in Controls*

# WORLD'S DEEPEST OIL WELL!




Richardson & Bass Drilling Rig No. 25 at well known as Richardson & Bass (Louisiana Account)—John W. Mecom —Freeport Sulphur Company—Humble-Louisiana Land & Exploration—State Lease 2414, No. 1-L. Rig and boilers are mounted on two huge barges sunk to bottom of marsh to provide firm foundation for operations.

## Record depth of over four miles attained in Richardson & Bass Louisiana Well using J&L Drill Pipe and J&L Wire Rope exclusively

Wednesday, November 9, 1955, marked another milestone in the spectacular history of the oil industry. On that day, Richardson & Bass and their associates in this enterprise, John W. Mecom and Freeport Sulphur Company, broke the world's record for deep drilling in their well in Plaquemines Parish, Louisiana, 35 miles southeast of New Orleans.

This well, now more than four miles deep, has penetrated the earth to depths never before explored. Pressures are being encountered to which drill pipe never before has been subjected.

In discussing this new world's record well, J. E. (Ed) Hill, General Manager of Richardson & Bass Drilling and Producing Interests, said: "This well has been drilled from the surface to its total depth without a single pipe failure, a tribute both to the skill of the drilling crews, and to the quality of the pipe used."

Every foot of the drill pipe in the well is J&L Drill Pipe. To a depth of 13,655 feet, J&L Blue Ribbon Drill Pipe was used. From that point to the bottom, the string was replaced with J&L Blue Ribbon Vanadium Drill Pipe. Every foot of the wire rope which supports the entire four mile string of drill pipe is J&L Permaset Wire Rope. Hundreds of tons of J&L Casing have been set in the well, with additional hundreds of tons standing by for use when the well is completed.

To provide the high strengths needed in oil country tubular products for today's deep well drilling, J&L developed and has in operation extensive new finishing facilities—facilities which are already being expanded to keep pace with the oil industry's growing needs.

## Interesting facts about world's deepest well

**(As of November 28, 1955)**

Total depth 22,209 ft., nearly 4¼ miles, equal to height of 15 Empire State Buildings . . . previous record depth 21,482 ft. . . . drilling began February 26, 1955 . . . total drilling time 205 days . . . total testing time 71 days . . . total elapsed time 276 days . . . bottom hole pressure 20,650 lbs. per sq. inch . . . bottom hole temperature 350° F. . . . time required to pull entire string of drill pipe to surface, replace bit and reset pipe is about 11 hours . . . stretch in drill pipe at extreme depth is about 20 feet . . . total cost of well estimated at between $1¼ and $2 million.

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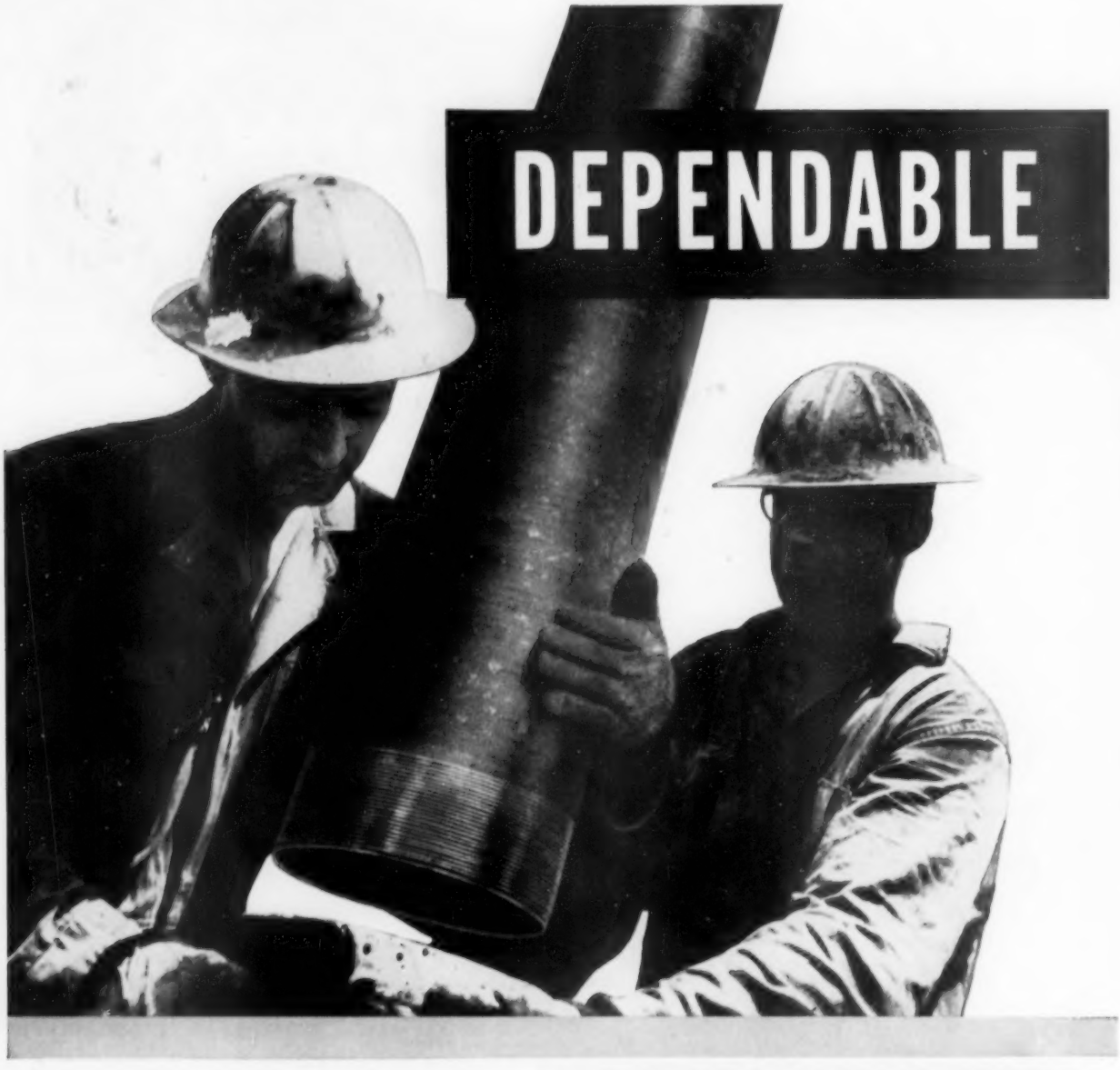
# DEPENDABLE



**EASE OF THREADING, BENDING, WELDING** are dependable features of Republic's Continuous Butt Weld Pipe. A standard in the oil and gas industry for years, this pipe is used for gathering lines, distribution lines and general maintenance work. Other features: uniform strength and ductility; tight adherence of the galvanized coating. Sizes ⅛" through 4" nominal. Available in economical double-random lengths. Call your Republic Distributor.

**FAST, DEPENDABLE WELDS ARE EASY** when you use Republic Electric Weld Line Pipe. Constant circumference assures quick, easy alignment. Uniform wall thickness prevents thin spots, provides a good base for strong, smooth beads. High ductility results in uniform bends in field or shop. Republic makes 2 types of electric weld: Electric Resistance Weld (2⅜" through 16" O.D.), Electric Fusion Weld (24" through 30" O.D.).

# ..right down to the last thread

It's a good one-word description of Republic Electric Weld Casing *quality*. And it's important to know that no matter how shallow or deep the well, you can count on *uniform dependability* throughout every joint in your string.

All Republic Electric Weld Casing is produced with precisely the same care. Skelp of uniform thickness is carefully trimmed to correct width, cold-formed and welded into a tube of uniform roundness. The highly ductile steel is fully normalized to assure uniform grain structure—then cold-sized to obtain a high-yield strength.

It's the uniform roundness and high-yield strength that provide such a strong resistance to collapse. But no less dependable is the Electric Resistance Weld. In fact, tests have proved *the weld to be as strong or stronger than the wall itself!*

Since no string is stronger than its weakest thread, Republic makes certain steel thickness under thread roots is uniform. And the clean, full-formed threads make it easy to stab, spin in and tong up quickly.

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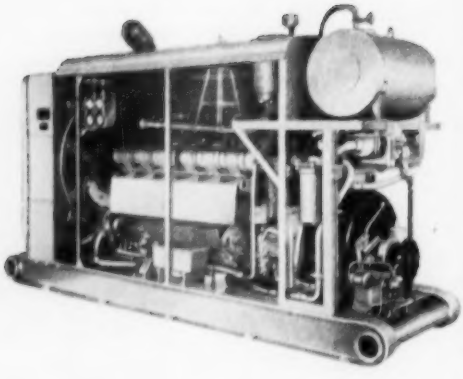

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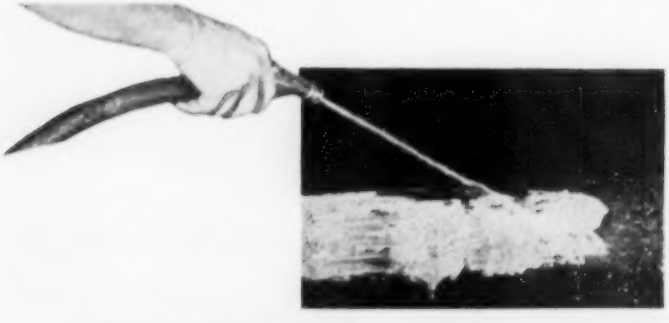

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"This is no gift or subsidy.

"The requirements upon us as to rental and subsequent purchase of the line are rigorous, but we realize this is necessary and proper. We have entered into the arrangement determined to carry out the spirit and letter of the agreement and we appreciate the far-sighted and business like participation of the governments.

"With this temporary government intervention, Trans-Canada is confident that the rest of our arrangements can be greatly facilitated. The pipe we need will be ready for our 1956 program and our financing will now go forward much more quickly with this concrete evidence of government confidence in our project."

*N. E. Tanner, president of Trans-Canada Pipe Lines, Ltd., in statement to press at Calgary.*

**Job for Oil Governors**

"I think at this stage in the progress of conservation that we as governors and other representatives of the producing states should initiate and take more positive steps to publicize those benefits to those in the consuming states, who for the most part, possess very meager knowledge as to what conservation of natural resources actually accomplishes." . . .

*Gov. Fred Hall of Kansas in address to Interstate Oil Compact Commission, Santa Fe, N. M.*

**Russian Aid Doubted**

Dear Sir:

Your report *(Oil and Gas Journal, November 28, page 68)* that Russia is offering "material and moral help" to Saudi Arabia in the boundary dispute with the British-protected sheikhdoms of the Arabian Peninsula is most interesting.

For in the recently published Soviet

Schlumberger wishes you a Happy New Year.

PAINTING - HANS HOFMANN, 1951

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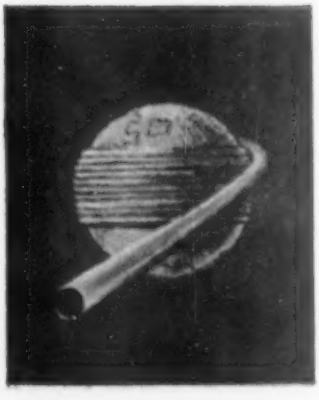

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Atlas of the World (Moscow 1954), now available in American libraries, an eastern boundary of Saudi Arabia is indicated which runs south or southwest from the base of Qatar Peninsula, and places the whole of the disputed area of Eastern Arabia (including the oasis of Buraimi) within British-protected territories.

Since the atlas expresses the official attitude of the Soviet Government on this and many other disputed territories, what "moral" help can Soviet Russia offer to Saudi-Arabia in this dispute?

Alexander Melamid
Professor of Economic Geography
New School for Social Research
New York City.

# CALENDAR

**1956**

**JANUARY**

**9-13** Society of Automotive Engineers, annual meeting, Sheraton-Cadillac and Statler Hotels, Detroit, Mich.

**16-18** Pipe Line Contractors Association, eighth annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

**25-26** Northwest Petroleum Association, annual convention, Nicollete Hotel, Minneapolis.

**25-27** Eleventh annual Symposium on Instrumentation for the Process Industries, Memorial Student Center, A. & M. College of Texas, College Station, Tex.

**26-27** Fifth Annual Instrument Short Course, Los Angeles Harbor Junior College, Wilmington, Calif.

**FEBRUARY**

**15-17** National Association of Corrosion Engineers Short Course for Pipeliners, Mayo Hotel, Tulsa.

**19-23** American Institute of Mining and Metallurgical Engineers, annual meeting, Hotel Statler, New York City.

**24** Natural Gasoline Association of America, Permian Basin meeting, Lincoln Hotel, Odessa, Tex.

**26-29** American Institute of Chemical Engineers, Statler Hotel, Los Angeles.

**27-29** American Association of Petroleum Geologists, Rocky Mountain Section, Auditorium, Denver.

**MARCH**

**1-2** Southern Gas Association, transmission management conference, Jung Hotel, New Orleans.

**7-9** American Petroleum Institute, Division of Production, Southern District meeting, Plaza Hotel, San Antonio, Tex.

**12-16** National Association of Corrosion Engineers, annual convention, Statler Hotel, New York City.

**19-21** Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

**21-23** American Petroleum Institute, Division of Production, Southwestern District meeting, Texas Hotel, Fort Worth.

**24** North Texas Oil and Gas Association, annual meeting, Wichita Falls, Tex.

**APRIL**

**3-5** Annual Corrosion Control short course, University of Oklahoma Extension Study Center, Norman, Okla.


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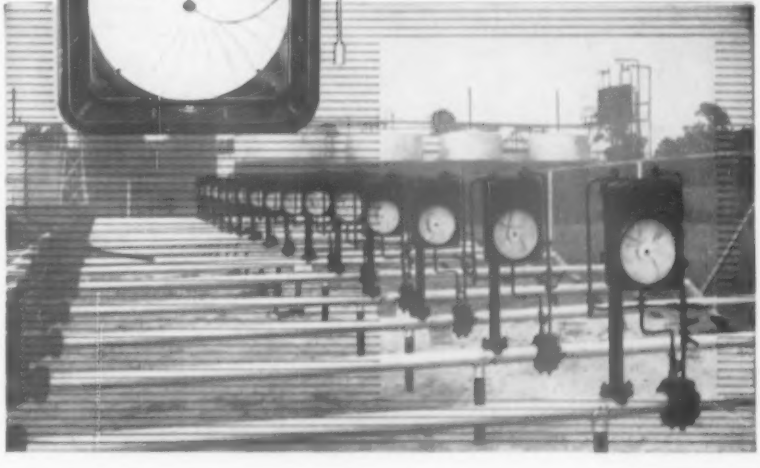

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4-6 American Gas Association, general management conference, Conrad Hilton Hotel, Chicago.

4-6 American Petroleum Institute, Division of Production, Mid-Continent District meeting, Broadview Hotel, Wichita, Kans.

8-13 American Chemical Society, general meeting, Dallas.

9-10 Texas Petroleum Research Committee, Ninth Oil Recovery Conference (Symposium on Natural Gas in Texas), Texas A. & M. College, College Station, Tex.

11-13 Natural Gasoline Association of America, Texas Hotel, Fort Worth.

14-15 Southern Gas Association, conference on use of electronic computers by engineering personnel, Hilton Hotel, El Paso.

14-18 Petroleum Equipment Suppliers Association, annual meeting, Boca Raton Hotel & Club, Boca Raton, Fla.

15-17 Texas Independent Producers and Royalty Owners Association, Statler Hilton Hotel, Dallas.

17-19 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.

18-20 American Petroleum Institute, Division of Production, Rocky Mountain District meeting, Cosmopolitan Hotel, Denver.

18-20 National Petroleum Association, semiannual meeting, Cleveland Hotel, Cleveland, Ohio.

19-21 Gas Appliances Manufacturers Association, annual meeting, The Greenbriar Hotel, White Sulphur Springs, W. Va.

23-25 Southern Gas Association convention, Dallas.

23-26 American Association of Petroleum Geologists and Society of Economic Paleontologists, annual meeting, Conrad Hilton Hotel, Chicago.

25-27 American Petroleum Institute, Division of Production, Eastern District meeting, Deshler-Hilton Hotel, Columbus, Ohio.

25-29 World Oil Exposition, Houston.

30

May 1 Independent Petroleum Association of America, semiannual meeting, Statler Hotel, Los Angeles.

30

May 4 American Petroleum Institute, Safety and Fire Prevention midyear meeting, Warwick Hotel, Philadelphia.

MAY

6-9 American Institute of Chemical Engineers, Roosevelt Hotel, New Orleans.

10-11 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Statler Hotel, Los Angeles.

10-11 American Gas Association, Gas Supply, Transmission, and Storage Conference, Conrad Hilton Hotel, Chicago.

14-17 American Petroleum Institute, Division of Refining, midyear meeting, Montreal.

16-18 American Gas Association, Chemical, Engineering, and Manufactured Gas Production Conference, Benjamin Franklin Hotel, Philadelphia.

24-25 Natural Gas and Petroleum Association of Canada, Sheraton Brock Hotel, Niagara Falls, Ont.

JUNE

17-22 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Atlantic City, N. J.

24-25 Canadian Gas Association, Manoir Richelieu, Murray Bay, Que.


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TULSA, OKLAHOMA

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# JOURNALLY SPEAKING . . .

## Ay-yinah is a Sample

HOW would you like to look for a Murtafa' Ardhi with an Alat Kiyas Al-Ihtizazat Al Ardiyah?

It's the same thing as looking for an anticline with a seismograph in this country, only you have to do it from right to left in Arabia. Also you have to master a strange alphabet without vowels, and expressed in a lot of odd curlicues that look more like chicken tracks than letters.

But that's easy to do, according to our Paul Swain, who tells (nearly) all about the Arabic language on page 225 of this issue.

We'll accept Paul's statement that the Arabs greatly improved mathematics by contributing the zero, but we are forced to conclude that their contribution to breaking down the international language barrier is also zero. We have decided not to go into production in the Middle East because that Arabic language seems to be even harder to interpret than some of the rules and regulations of state regulatory bodies in this country.

The only advantage we can see to learning Arabic is the ability to read the unexpurgated Arabian Nights in the original, and at our age it isn't worth it.

## Mental Globe Trotting

WE always enjoy going through the Journal's International Issue, not so much for the facts and figures which the staff spent many laborious months putting together, as for the random and irrelevant thoughts that pop up.

Just reading the names of the various countries recalls our youthful days when we collected stamps and learned about geography by sorting out the brightly colored bits of paper. Guatemala had the most attractive stamps, as we recall, but we judge that its laws and jungles don't make it the most attractive place in which to look for oil.

Our stamp album had the names of a lot of outlandish places we never heard of otherwise, but the oil industry's world-wide peregrinations constitute an even stranger gazetteer.

Yemen, for instance. We never saw a stamp from Yemen, but today oil men are putting their stamp on that region that time passed by. Yemen, we understand, was the home of King Solomon's lady friend, the Queen of Sheba. During the Roman Empire it controlled the spice trade with the East, and was the source of frankincense and myrrh. Then for centuries it was a forbidden kingdom, an oasis completely protected by a desert of shifting, whispering sands. Now oil men are trying to open it up. If they open up production it will probably be wide open.

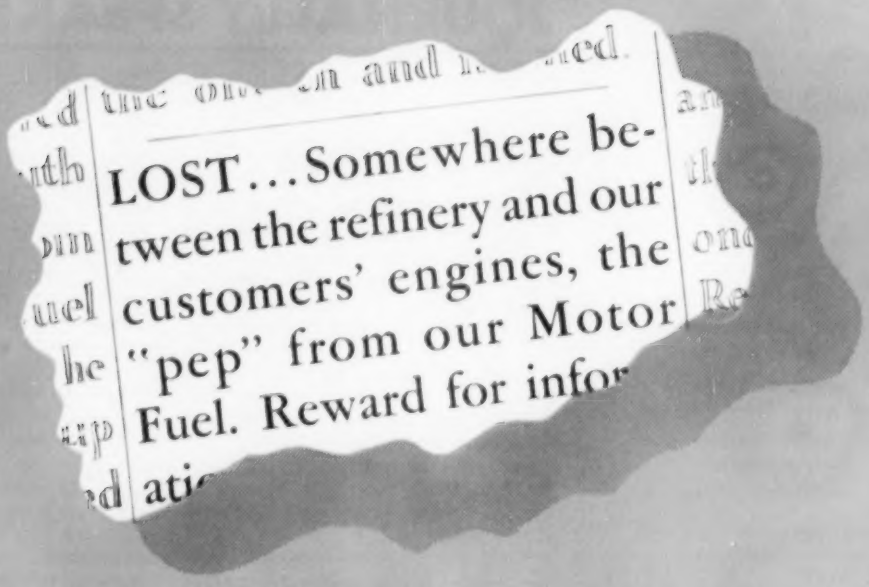
New Guinea is another place that time passed by. Its natives are still living in the stone age. Most of them never saw a civilized man until some Japs and G.I.'s had an uncivilized meeting there a dozen years ago. Now the bases that MacArthur left behind are the bases for an invasion of oil men.

All we know about those Persian Gulf countries is the stories we used to read in the Arabian Nights. Today, it appears, that 50-50 split with the oil operators enjoyed by the royal families has restored the region to more than Oriental splendor and made the Middle East the Land of the Sky-Blue Cadillacs. In contrast with Texas, the operators talk and act poor while the royalty owners toss dough around with a free hand. That 50 per cent take of some of those governments looks high at first glance, but a lot of U. S. operators, after paying their taxes here, would be glad to settle for a similar deal.

Another thing we like to do with this International Issue is to tot up the results of oil finding by nationalistic government monopolies and compare them with the progress of free enterprise. It's a mighty lopsided score, as usual, and ought to convince even the Commies. But every once in a while some monopoly makes just enough of a hit to feed the flames of nationalism. Oh, well; a rundown of the list of countries where free enterprise has a chance for its white alley suggests that there are plenty of places to look for oil without crossing swords with a government monopoly.

To get away from these random thoughts and back to the facts and figures of world-wide operations—you'll find plenty of them starting on page 141.

—*Henry D. Ralph.*

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# Now they're out in the open where we can hit back

NOW that the opposition to the Harris-Fulbright gas bill has come out in the open, the job of fighting it should be easier. No longer need producers joust with windmills of vague "consumer interest." The opposition has identified itself as people with special axes to grind.

Spearheading the fight to retain federal regulation of gas production is the newly organized Council of Local Gas Companies, composed of some 40 distributors, largely in the East. It shouldn't take much research to show that these 40—out of 1,200 distribution companies in the United States—are trying to protect their own special interests.

Most of these council members have retail prices that are among the highest in the nation—well above the national average. They charge from 60 cents to well over $1 for distributing gas that cost 8 to 12 cents in the field and 20 to 30 cents to transport. Several of them rather recently converted from manufactured gas—possibly without adequate knowledge of the natural-gas business.

THIS MAKES THEM VULNERABLE TARGETS. Obviously they are trying to cover up their own ignorance or inefficiencies by making producers the scapegoat for their troubles. Certainly they can be shown up as working for themselves only—not for consumers.

Some strange bedfellows are lined up with these distributors.

State and municipal authorities whose job is to regulate retail gas prices are joining with the distributors to defend high distribution costs and put the blame on producer prices which are generally about 10 per cent of the total. This looks suspiciously like an attempt to cover up their own failure to do a proper job of regulation in their own areas.

Americans for Democratic Action, an admittedly left-wing political pressure group, is vigorously fighting the Harris bill. Ranged alongside are several labor-union and other pressure groups which traditionally follow a leftish "party line." Their only interest is extending federal control of all business.

THERE'S THE OPPOSITION—special interests and professional left-wingers. What about the consumers themselves? People working for the Harris bill report that consumers and the general public are surprisingly apathetic about the whole thing and don't care much one way or the other. Many local gas companies are so unpopular that their customers distrust anything they say. Most of the noise is being stirred up by self-appointed consumer champions.

With the opposition line-up out in the open, it should be easier for producers to convince those senators who have been silent or on the fence that the claims to speak for the public interest are a phony smokescreen hiding selfish personal interests.

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# The Industry This Week

## Drilling

• **Drilling is at an all-time high.** Last week 3,137 rotary rigs were running—the greatest number in history, according to Hughes Tool Co. figures. Previous peak was in December 1951 when the number hit 3,021.

Drilling efficiency is up, too. Operators will drill about 57,000 wells this year using an average of 2,695 rotaries. As recently as 1951 they drilled only 44,516 with an average number of rigs for the year of 2,552. In brief, completions are up 29 per cent; number of rigs is up only 5.6 per cent.

**The world's deepest hole** is looking more and more like the world's deepest producer, too. Richardson & Bass has bottomed the well, located near Port Sulphur, La., at 22,559 ft. The blowout scare is over. And an oil completion perhaps as deep as 21,500 ft. is indicated by early February. P. 130.

## Labor

• **Oil-industry employment** is near its all-time peak. Wages are up, too, with this year's payroll 17 per cent higher than 1950. Study shows pay for non-supervisory workers in oil industry now averages $2.36 an hour. P. 134.

## Exploration

• **A new technique to turn many dry holes** into producing wells has been developed by Atlantic Refining Co.

The method is based on the fact that underground formations and the fluids they contain show varying resistances to passage of electrical current. The secret is a new method of studying old cuttings and correlating the information with that on old electric logs. P. 128.

**The prized geological area of Colombia** has been won by Cities Service Co. Exploration work will be started immediately on the 2,200,000-acre El Carare area in the Magdalena River Valley. It is a joint venture with the Colombian Government company, with Cities Service meeting 75 per cent of the costs for 75 per cent of any oil after royalty. P. 138.

## Processing

• **Keener competition in synthetic rubber** may lie ahead. General Tire and El Paso Natural have agreed to build jointly a multimillion-dollar plant in West Texas.

It will give its owners many competitive advantages. The plant will use El Paso's natural gasoline, butane, and propane to make styrene and butadiene. It will use General Tire's rubber-making know-how and processes to convert these into rubber products. It is the first privately financed rubber plant since the war. P. 123.

**A 12,000-bbl. refinery will be started soon** near Hattiesburg, Miss. Fluor Corp. will build the plant for Pontiac Eastern, an affiliate of Pontiac Refining. P. 137.

**Shell is ready to build a refinery** in the Philippines. The project hinges on government approval. P. 140.

## Natural Gas

• **The fair-field basis for pricing gas** produced by pipeline companies has been given a set-back in federal court.

An appellate court has ruled that if the FPC uses this yardstick it must prove the price is just and reasonable compared with prices figured on the traditional rate-base method. It means the FPC may have to use cost basis for setting prices not only for company-produced gas but also for that of independent producers. P. 125.

# Payoff Is Nearing in Gulf Operations

**Joe Reilly**

OIL operations in the Gulf of Mexico should start paying their own way during 1956.

Now completing their most successful year in history, offshore operators still are losing more than $100,000 a day off the Texas and Louisiana coasts. If production from offshore fields continues to increase at its current rate, seagoing operators can hope to start breaking even late next year.

This doesn't mean they will have their total investment back by then. It means merely that, with continued good fortune, their combined daily income from offshore production may equal their daily expenses. Several more years will be required to recover the bonuses paid for tidelands leases.

It looks like a bleak picture at first glance. But it's not. Oilwise, this section of the Continental Shelf is proving richer than most interested companies dared hope for even a year ago. Probably nowhere else in the oil country is there such an abundant supply of optimism.

A quick look at statistics gives ample cause for rejoicing:

... **Offshore production** of crude and condensate has risen to about 90,000 bbl. daily as compared to the 1954 average of 44,000 bbl.

... **This year's oil output** totals more than 24,000,000 bbl. for a gain of 50 per cent over the 1954 total.

... **Thirty-two oil and gas fields** have been discovered off Texas and Louisiana in the past year. These represent more than 40 per cent of all discoveries to date.

... **More than 70 per cent** of the wells drilled off Texas and Louisiana this year have found oil or gas in commercial quantities.

## Who's Producing Offshore

| Company— | Daily prod. (bbl.)* |
|---|---|
| California | 33,000 |
| Shell | 29,000 |
| Magnolia-Continental-Newmont | 7,000 |
| Humble | 4,000 |
| Texas | 3,000 |
| CATC Group | 2,000 |
| Pure | 2,000 |
| Kerr-McGee | 1,500 |
| Mecom | 500 |
| Gulf | 500 |
| Phillips | 500 |
| Standard of Texas | 500 |
| Sun | 100 |

*Crude and condensate, as of October 1, in round numbers.

... **During the first 10 months** of the year, operators completed 181 oil wells and 35 gas wells off Louisiana alone. Only 149 oil wells and 25 gas wells were completed in the area during the entire year 1954.

... **Gross income** from oil and gas produced in the tidelands now is estimated at about $275,000 per day, a gain of nearly 45 per cent in the past 6 months. A similar gain in the next 12 months would boost daily income to $585,000 by the end of 1956.

**Economics . . .** Total expenditure to date in offshore oil operations is estimated at about $1 billion.

This includes roughly $340,000,000 in lease bonuses; $400,000,000 in drilling costs; $100,000,000 in offshore structures, rigs, and production equipment; $50,000,000 in rentals and royalties; and $15,000,000 in production and transportation costs. The remainder covers costs of seismic operations, insurance, etc.

Cumulative income, before payment of royalties, totals about $200,000,000, leaving a net loss to date of about $800,000,000. And the over-all loss is mounting daily.

A recent survey showed 66 rigs were operating in the Gulf, 59 of them in

the Louisiana area and seven off Texas. Although the cost of drilling at sea varies greatly depending on depth of water, type of equipment, and other factors, the average cost of operating an offshore rig is estimated at about $5,000 daily. In other words, operators are spending roughly $330,000 daily in offshore drilling.

Add to this the cost of rentals (estimated at $10,000 a day) and production and transportation costs (about 20 cents per barrel). Total daily costs then amount to an estimated $358,000, excluding lump-sum investments in rigs, drilling structures, production platforms, service boats, leases, geophysics, and other items.

Daily income from crude, condensate, and the relatively small volume of gas which is sold from the tidelands amounts to about $238,000 after royalty payments. Net loss on day-to-day operations then is about $120,000.

Most of the companies operating in the Gulf are sharing to some extent in this daily loss. Companies with the most production are doing the most drilling. Consequently, their expenditudes are increasing about as fast as their income.

But the very fact that activity is spreading so fast is convincing evidence that the major companies think the long-range odds are favorable.

**Growth of activity . . .** The boom in offshore operations started in 1953 when Congress passed the Tidelands act.

In that year 73 wells were completed in the Louisiana tidelands. The number jumped to 233 in 1954. In the first 10 months of this year, 293 wells were completed.

Up to November 1 there had been about 840 wells drilled off Louisiana and 65 off Texas. More than 60 per cent of these were completed during the past 2 years.

Records compiled through October 31 show 504 oil wells and 98 gas wells in the Louisiana tidelands. Off Texas, there were 14 oil wells and 19 gas wells and 28 dry holes.

Totals for Louisiana are based on Conservation Department records, with estimates used for the number of wells completed before 1949.

There now are 7 productive fields off Texas and 66 off Louisiana. Most of the gas fields and a few of the oil fields, however, are shut in for lack of pipeline outlets.

Continued expansion of offshore activity is indicated by the growing number of offshore rigs in service. At the end of 1953 there were 22 units working off Louisiana. The number has almost tripled in the past 2 years.

## Offshore Discoveries in 1955

### Off Louisiana

| Area and operator— | Block | Production | Prod. interval (ft.) | Potential (bbl.) | Choke size (in.) | Gravity |
|---|---|---|---|---|---|---|
| Breton Sound: | | | | | | |
| Republic Nat. | 1 | Gas-cond. | 7,421-23 | | | |
| East Cameron: | | | | | | |
| Forest | 4 | Gas-cond. | 13,111-21 | | | |
| Shell | 17 | Gas | 11,956-66 | | | |
| Continental | 49 | Gas-cond. | 11,090-96 | | | |
| Eugene Island: | | | | | | |
| Pure | 47 | Gas | 8,480-94 | | | |
| Magnolia | 128 | Oil | 10,110-30 | 532 | 12/64 | 39.8 |
| Grand Isle: | | | | | | |
| Continental | 47 | Oil | 9,868-74 | 348 | 10/64 | 33 |
| | | | 13,614-20 | 410 | 10/64 | 37 |
| Main Pass: | | | | | | |
| Continental | 25 | Oil | 6,224-30 | 236 | 10/64 | 28.6 |
| Kerr-McGee | 47 | Oil | 8,192-8,218 | | | |
| Ship Shoal: | | | | | | |
| Magnolia | 113 | Oil | 7,532-38 | 218 | 10/64 | 27 |
| Ocean Drilling | 67 | Oil | 12,137-41 | 287 | 1/8 | 32 |
| Gulf | 154 | Oil | 6,196-6,218 | 250 | 10/64 | 29 |
| South Pass: | | | | | | |
| California | 5 | Oil | 9,079-90 | 189 | 9/64 | 36.7 |
| California | 41 | Oil | 10,096-10,108 | 238 | 9/64 | 34.7 |
| Shell | 6 | Oil | 8,337-40 | 206 | 10/64 | |
| Shell | 30 | Gas | 9,528-46 | *4,050 | | |
| South Timbalier: | | | | | | |
| Sinclair | 15 | Gas-cond. | 11,986-96 | | | |
| Humble | 54 | Oil | 6,591-6,605 | 216 | 1/8 | 37.5 |
| West Cameron: | | | | | | |
| Pure | 99 | Gas | 1,707-09 | | | |
| Phillips | 40 | Gas-cond. | 13,916-50 | | | |
| West Delta: | | | | | | |
| Shell | 2 | Oil | 11,278-88 | 265 | 1/8 | |
| Continental | 970 | Oil | 5,746-60 | 228 | 9/64 | 23.8 |
| | | | 7,313-50 | 353 | 9/64 | 29.9 |
| Continental | 55 | Gas | 4,844-52 | *1,870 | 14/64 | |
| Continental | 56 | Gas | 4,361-65 | | | |
| Continental | 58 | Gas-cond. | 11,668-78 | 244 | 11/64 | |
| Continental | 59 | Oil | 12,736-40 | 377 | 9/64 | 36.4 |
| Continental | 84 | Oil | 10,857-64 | 326 | 10/64 | 36.1 |

### Off Texas

| | | | | | | |
|---|---|---|---|---|---|---|
| Galveston: | | | | | | |
| Pure | 189 | Gas | | | | |
| Stanolind | 144 | Gas | | | | |
| High Island: | | | | | | |
| Magnolia | 10 | Gas | | | | |
| Mustang Island: | | | | | | |
| Sun | 976 | Gas | 9,112-38 | *5,000 | | |
| Gulf | 889 | Oil | 11,452-86 | 140 | | |

*Thousand cubic feet.

**Big fields . . .** Three fields off Louisiana have produced more than 10,000,000 bbl. of crude and condensate each. They are all relatively old fields, with production dating back at least 5 years.

Greatest cumulative production, up to July 1, was from Blocks 2 and 3, Bay Marchand area, off Lafourche Parish. This field had produced more than 12,200,000 bbl. of crude and condensate by midyear. As of July 1, it had 57 productive wells with an average daily output of more than 7,500 bbl.

Closely following were South Pass Block 24 field and Main Pass Block 69 field, both off Plaquemines Parish. Each of these has produced more than 10,000,000 bbl. of crude and condensate.

These three fields are among the seven discovered to date having potential oil reserves estimated at more than 100,000,000 bbl. each.

Others considered likely to fall into this classification of "major" fields are Eugene Island Blocks 126 and 128, West Delta Block 30, and Grand Isle Block 18.

In addition, there are six gas fields

with potential reserves estimated at more than 500,000,000 M.c.f. They are Vermilion Block 39, West Cameron Blocks 149 and 192, West Delta Blocks 58 and 59, East Cameron Block 71, and Eugene Island Block 32.

Total possible reserves, based on discoveries already made, are estimated at about 1,700,000,000 bbl. of crude and condensate and 10,000,000,000 M.c.f. of gas. These estimates are for the Louisiana and Texas tidelands combined with the overwhelming majority being allocated to the Louisiana portion.

South Pass Block 24, considered by many to be the greatest reserve yet tapped in the gulf, has 98 producing wells. During the first 6 months of 1955 the field produced an average of more than 18,000 bbl. of crude and condensate daily.

Shell Oil Co., one of the principal operators in this area, recently announced plans to install a central storage unit and natural-gas plant to handle the field's output *(The Oil and Gas Journal, December 12, page 67)*. The field is easily the largest offshore in terms of daily output and number of wells.

**Outlook for '56 . . .** The brief but impressive history of South Pass Block 24 field gives a preview of what to expect in other areas of the gulf.

At the end of 1951, a year after its discovery, the field had only six producing wells. The number of producers increased to eight by the end of 1952 and to 27 in 1953. By the end of 1954 it had 81 producers. In the meantime, production had jumped from 579,366 bbl. in 1951 to nearly 4,500,000 bbl. in 1954.

The coming year probably will bring a surge in development drilling and a consequent increase in the number of fields paying their own way. Yet, because of the increased number of offshore rigs available, operators will be able to continue exploration drilling at about the 1955 rate.

By the end of 1956 there are expected to be 11 rigs operating off Texas and 98 off Louisiana.

Emphasis in the past has been on finding new fields. Operators now will start developing more production from known fields. They have to if they hope to get their money back.

There now are about 40 shut-in oil and gas fields off the Louisiana coast. In the Texas tidelands, only one of seven fields is producing.

Development of some of the fields, notably gas reserves and marginal oil fields, will be held up until more pipelines are built.

**Long-range outlook . . .** The tidelands are living up to their advance billing as America's great oil frontier.

## Louisiana Offshore Output

| Year | Crude and cond. (bbl.) | Natural gas (M.c.f.) | Casing-head gas (M.c.f.) |
|---|---|---|---|
| 1947 | 3,217 | | 128 |
| 1948 | 132,299 | | 19,789 |
| 1949 | 1,064,265 | 7,903 | 633,684 |
| 1950 | 4,336,141 | | 2,896,960 |
| 1951 | 6,561,307 | 9,864,605 | 4,426,308 |
| 1952 | 6,906,085 | 34,338,968 | 4,406,353 |
| 1953 | 10,127,375 | 38,156,488 | 7,287,775 |
| 1954 | 16,000,865 | 64,456,633 | 11,496,638 |
| 1955 (9 mos.) | 17,266,133 | 66,001,073 | 16,408,742 |
| Total | 62,397,687 | 212,825,670 | 47,576,377 |

Source: Louisiana Department of Conservation.

Total oil reserves under the Gulf have been estimated at 10 billion barrels in the federal section of the Continental Shelf alone. Discoveries to date indicate the estimate may prove conservative.

The Government's total share of the oil, based on that estimate, would come to about $5,500,000,000 including lease bonuses.

The Interior Department has indicated it may offer more offshore leases during the coming year. If so, there will be some companies eager to increase their gamble, perhaps with bids of several hundred dollars per acre.

Rapid rise in lease costs is perhaps the best proof of the high hopes held by offshore operators. A few years ago, leases in the Gulf were going for $5 an acre and less. George B. Parks, of Kerr-McGee Oil Industries, Inc., pointed out recently that the average price per acre to July 1, 1954, was about $42. By August 1955 the average had soared to around $294.

The early offshore gamblers — the pioneers who put big money into the then unknown—have not only survived the jibes and laughter of the more cautious; they're looking wiser as the months go by.

# *Processing* BRIEFS

**BILLINGS, Mont.—Carter Oil Co.** has just made its first sale of fluid coke for commercial use. Mojave Mining & Milling Co. of Wickenburg, Ariz., has contracted for 100 railway cars, about 5,000 tons, of the coke for use as boiler fuel for its plant. Carter will deliver two cars weekly under terms of the deal.

Previous sales of coke from Carter's 25,000-bbl. refinery here all went to various industrial users for testing purposes. The fluid coker was completed only last spring. It was the first such installation at the time and represented more than 4 years of research and development work.

**LODGE GRASS, Mont.—Petroleum** Products Refining & Producing Co., Austin, Tex., is building a 3,000-bbl. asphalt plant here. The plant will use oil from company property in Soap Creek field. The plant is due for completion next June.

**DENVER.—Workers at Shell Oil** Co.'s new refinery at Anacortes, Wash., have selected the Oil, Chemical and Atomic Workers International Union as their bargaining agent. The vote, announced by O.C.A.W. here, was: O.C.A.W., 177; Operating Engineers, 54; against both organizations, 30; not voting, 10.

**DELAWARE CITY, Del. — Tide** Water Associated Oil Co. has begun work on a Unifining unit to desulfurize distillate stocks at its new 130,000-bbl. refinery here. Capacity of the unit was not revealed. It will be used to remove sulfur and nitrogen compounds from various partially finished blending stocks during processing.

**BILLINGS, Mont. — Powder River** Pipeline, Inc.'s, new 106-mile Montana line is now delivering crude oil from the Sumatra field to the Billings-Laurel refining area. The $2,000,000, 6-in. line has an ultimate capacity of 16,000 bbl. daily. It is the first crude line completely within Montana.

**ST. LOUIS. — Petrolite Corp., pro**ducer of chemicals for the petroleum industry, has completed the purchase of Bareco Oil Co. of Barnsdall, Okla. Bareco, which has a 100,000-lb. daily wax plant at Barnsdall, will be operated as Bareco Wax Co., a division of Petrolite, with headquarters in Kilgore, Tex. Bareco received 25,000 shares of Petrolite stock in the deal.

**TORONTO.—Imperial Oil, Ltd., has** taken its place in Canada's mushrooming petrochemical industry. A newly established chemical products department will deal with the sale or other use of raw chemicals produced by Imperial's manufacturing department.

The company indicates it may begin manufacturing its own chemical products, as well as "selling to outside interests." Heading the new department is Clayton M. Beamer, recently general manager of Esso Standard Oil Co.'s chemical products department.

General Tire's William O'Neil (right) and El Paso Natural's Paul Kayser sign deal turning . . .

# Gas to Rubber in Same Plant

## ● West Texas will get first U. S. integrated synthetic rubber plant; move underscores some significant trends

AKRON.—America's soaring demand for synthetic rubber encouraged another marriage of convenience last week between a giant tire maker and a big natural-gas producer.

General Tire & Rubber Co. and El Paso Natural Gas Co. have agreed to jointly build a multimillion dollar synthetic rubber plant near Odessa in West Texas. General is the world's fifth largest rubber maker. El Paso Natural is one of the nation's major natural-gas pipeline firms.

Their agreement works like this:

El Paso Natural will furnish the basic ingredients for styrene and butadiene from its stream of natural gasoline, butane, and propane. General will provide the rubber-making know-how.

**What it means . . .** The action points up several significant trends for synthetic rubber, one of the major fields for petrochemicals. These include:

**. . . Big future market.** Production has jumped this year, causing many other rubber makers to expand plants. General and El Paso Natural are betting this trend will continue.

**. . . First privately financed** and completely integrated operation since the war. Joint efforts of a rubber firm and oil producer are not new. But the General-El Paso Natural move reveals financial confidence that integrating raw material processing and rubber making in one plant will give them an advantage.

**. . . Wartime rubber plants are outmoded.** These facilities are 15 years old, undersized, and must be up-dated to keep pace with the synthetic rubber race.

**. . . Move away from petrochemical row** on Louisiana-Texas Gulf Coast. It may herald the industrial development of new areas in the Southwest and West Texas.

**How it works . . .** Plant site selected is a natural.

Odessa is located is the heart of the raw materials source. Both oil and natural-gas production are in the backyard of the proposed plant. The new facilities literally will extract raw materials from the ground, convert them into styrene and butadiene and process them into GR-S synthetic rubber in a single production flow.

The long-term agreement between General and El Paso Natural covers production and sale of styrene and butadiene to supply the new GR-S copolymer plant. Details on the extensive plant required have not been revealed.

Construction of the new facilities, however, is scheduled to start immediately. Production of synthetic rubber is expected to start about July 1, 1957. The copolymer plant will have a rated capacity of 40,000 long tons of GR-S.

**Who does what . . .** Officials of both firms think highly of their deal.

William O'Neil, president of General, says the agreement climaxes years of research and development in synthetic rubbers for his company. The stress has been on modern, streamlined equipment and processes.

O'Neil explains the equipment in the plants built during the war emergency does not lend itself readily to improvements developed by General in processing synthetic rubbers.

General operated the government-owned GR-S plant at Baytown, Tex., from 1943 until April this year when it was sold to United Carbon Co. It currently produces synthetic rubber latex and rubber chemicals at Mogadore, Ohio, plant. The Odessa plant will put General in the synthetic race with the latest facilities and closely tied to assured raw materials.

Paul Kayser, president of El Paso Natural, says the agreement marks his firm's entry into the chemical industry. It also comes as the answer to a problem. El Paso has a stream of natural gasoline, butane, and propane of about 25,000 bbl. daily. This byproduct of its natural-gas production and transmission is growing rapidly.

**New boom area . . .** Kayser predicts the new plant is the beginning of West Texas industrial development.

The Southwest and West are growing populationwise at three times the national average. He points out industry tends to follow the trend in population growth. Locating an operation of this character near the source of supply in an expanding market will step up development of West Texas.

Bulk of new petrochemical plants previously have been located along the Louisiana-Texas Gulf Coast. Raw materials also are close by there and cheap water transportation is available.

General and El Paso Natural apparently are confident their new process plus untapped raw materials will overcome coastal advantages. The move fits in with Defense Department objective of spotting new plants in a critical industry away from existing concentrated centers of such industry.

**Others in parade . . .** The Odessa plant is the latest in a long list of synthetic-rubber industry expansion projects.

Goodyear Tire & Rubber Co. plans to boost capacity 50 per cent at its Houston plant. Firestone Tire & Rubber Co. is in the midst of a big construction program at its Lake Charles, La., plant. Others with expansion plans include U. S. Rubber Co., Goodrich-Gulf Chemicals, Inc., and Texas-U. S. Chemical Co.

Production of synthetic rubber is expected to reach an all-time high this year under private-operation of the former government-owned plants. Indications are output will reach 950,000 tons compared with 622,852 tons in 1954.

FRANK G. McCLINTOCK: "People don't know the facts of our business..."

# Drillers Have a Story to Tell

AMERICA's drilling contractors have decided it's time to put their best foot forward.

They believe they're already doing a good job for the oil producers. They're giving their employes a square deal, they feel, and offer a good future for a young engineer scouting around to find his niche in the oil business.

But the drilling contractors have found that the facts as they know them, and what other people believe them to be, are not always the same. In short, they have a public-relations problem.

It has been dumped into the lap of an 11-man customer and public-relations committee of the American Association of Oilwell Drilling Contractors whose chairman is Frank G. McClintock, president of Zephyr Drilling Corp., Tulsa.

The group has decided what needs to be done. Members are now studying how to go about it. They will present a progress report to the association board at its February 8 meeting, and soon hope to be telling their story through the trade press and by other means.

The emphasis, McClintock says, will be on factual articles which will show:

... **What the profits situation** really is, to dispel some notions that contractors may be gouging their customers.

... **How much their costs** have increased, and how drilling contractors' costs are related to costs of producers.

... **How much muds, new bits, new techniques,** and other advances have benefited producers.

... **How much per-foot drilling costs** have been reduced in recent years.

The contractors also want to reach a better understanding with producers on types of responsibility. They're seeking a better understanding of their problems, and want to show the need for better cooperation with producers in carrying out a contract.

This would be only one phase of the information program. Others would be aimed at employes and engineering undergraduates who are prospective employes. The theme here will be that the drilling industry offers employment that compares favorably with other industries in stability, opportunity, and safety.

**What producers believe . . .** The need for a public-relations program was pointed up in a survey on what other people think of the drilling contractors.

The contractors knew that their relations with customers and employes were not what they should be. If they were, the contractors wouldn't be accused of getting rich at the expense of their customers and workers. They wouldn't be having trouble negotiating contracts, and wouldn't have such a high turnover or so many hiring problems.

They knew things weren't getting any better. But they may not have been ready for some of the answers to questions asked by the Cain Organization, Inc., of Dallas, in interviews with executives of 59 oil-producing companies. Here's what Cain found:

**That 40 of the producing firms** are contracting more drilling than formerly, and 8 now contract all their work.

**That the average estimate** of contractors' profits last year was 16.5 per cent of gross. They were not that high.

**That all realize operating costs** are up, but the average estimate of the increase since 1941 was only 56 per cent. Costs actually are up 94 per cent.

**That the average guess** on the increase in penetration rate since 1941 was 62 per cent, while actually it has been 88 per cent. Twelve per cent thought per-foot costs had not been cut at all, or that no such savings have been passed on to the producer.

**What employes believe . . .** When the Cain Organization interviewed contractors' employes, they found how serious the turnover problem really is.

Only 6 per cent of the employes interviewed had been with their present employer more than 5 years. Only 10 per cent said they believed, when they accepted a job with a drilling contractor, that the job was particularly desirable or that it had a good future. But 60 per cent now feel they have a good future.

They also criticized lack of security and failure of contractors to have retirement plans.

Employe estimates of contractor profits averaged 15.3 per cent. Guesses ranged all the way from 5 to 50 per cent.

When asked to propose improvements, employes mentioned better equipment more often than anything else. Next in order came better treatment of employes, safety methods, management practices, maintenance, and a shorter work week.

McClintock says the public relations committee will draw up its program on the basis that people are misinformed about their business. The committee hopes to set the facts straight on the theory that a greater knowledge of their operations will bring better understanding, and better understanding will be of benefit to the contractors, their customers, and employes alike.

# Fair-Field Prices Jolted

## Court rules they also must be just, reasonable; decision may force FPC to use cost basis for pipeline-owned gas

WASHINGTON.—The Federal Power Commission's fair-field price for pipeline-company gas production is up for a thorough review.

A District of Columbia Appeals Court decision this month doesn't rule out the fair-field price. But it holds it must be just and reasonable as compared with prices figured on the traditional rate-base method.

Unless the FPC comes up with a method of setting field prices that can meet the court's requirements, it may have to set prices on the cost basis not only for company-produced gas but also for that of independent producers.

The court's unanimous decision sets aside a $12,800,000 rate increase granted Panhandle Eastern Pipe Line Co. nearly 2 years ago. It questions some $3,500,000 of the increase, representing the difference between rates figured on the cost basis and the fair-field price for gas.

The decision says that allowance of the fair-field value on Panhandle's own gas is not shown by the evidence and findings to be in the public interest. The case goes back to the FPC for further hearings.

**Must be needed . . .** Cost is not necessarily the only basis on which the commission can figure company-gas prices, the court says.

Fair-field price is not ruled out. But, the court adds:

"If the commission contemplates increasing prices for the purpose of encouraging exploration and development, or the ownership by pipeline companies of their own producing facilities, it must see to it that the increase is in fact needed, and is no more than is needed, for the purpose . . . the commission cannot go without additional authority from Congress."

The cost method is not the only one available under the Natural Gas Act. But it must be used as a basis of comparison, the decision rules.

"It has been repeatedly used by the commission, and repeatedly approved by the courts as a means of arriving at lawful—'just and reasonable'—rates under the act. Unless it is continued to be used at least as a point of departure, the whole experience under the act is discarded and no anchor, as it were, is available by which to hold the terms 'just and reasonable' to some recognizable meaning."

The FPC, no matter what formula it uses, must not lose sight of the fact it must always keep in mind "the primary aim of the act is to guard the consumer against excessive rates," the court said.

The opinion points out that the Supreme Court decision in the Phillips case gives the FPC jurisdiction over all gas going into interstate commerce, regardless of who purchases it. In reviewing the record in this case, it says the commission should consider the impact of that decision upon "its stated reasons for desiring to encourage pipeline companies to produce their own gas.

"The effect of the decision will probably be to subject to federal regulation the prices paid by pipeline companies for most of the gas they purchased," it points out. "Consequently, the question of indirectly influencing these prices by the means here chosen by the commission, such as augmenting the bargaining power of the pipeline company, may be considerably affected."

**Not the last word . . .** The FPC will have to consider whether it will appeal the decision or reopen the Panhandle case.

But observers believe the U. S. Supreme Court eventually will have to consider the issue, particularly if the appeals court finally flatly rejects the fair-field method.

The decision also is seen as giving new impetus to the drive for passage of the Harris bill. That bill writes the fair-field method of figuring rates into law in a provision directly aimed at the possibility the courts would not approve the FPC's policy.

The Panhandle rate case was carried to the courts by the city of Detroit and Wayne County, Michigan. They had fought the fair-field price theory through the hearings before the FPC, arguing that the cost method was the only way of arriving at just rates.

# Frontier Tests New Refinery Units

CHEYENNE, Wyo.—Frontier Refining Co. will boost the charging capacity of its refinery here from 10,000 to 12,500 bbl. when it puts two new units on stream early next month.

They are a 2,500-bbl. Platformer and a 3,000-bbl. Unifining unit. They are now being tested. Operators expect them to be ready for use about January 1.

Frontier is spending $1,500,000 on the new construction including cost of the two units. Procon, Inc., began the installation work last May.

The new units are pictured above. From left to right are shown the pretreating clay towers, formerly the acid contractors; the prefractionator column with scaffolding around it; the bell-shaped platforming catalyst reactors; the platforming furnace; the Unifining reactor furnaces; and stripping columns. The two units are licensed by Universal Oil Products Co., Inc.

**HEREFORD HEIFERS** were presented by Texas crude-oil men to a reflective Ralph Dietler at an Austin dinner preceding Dietler's last appearance at a proration hearing. Humble's Don Haynes makes the presentation. At left: Toastmaster George Goad, of Tide Water.

# Oil Buyers' "Dean" Prepares to Retire

"HE made himself the most popular man in the business by taking a highly unpopular position most of the time."

That's the way one of his competitor-friends describes Ralph C. Dietler, the "dean" of crude-oil men.

This week Dietler winds up 37 years with affiliates of Standard Oil Co. (Ind.) and retires. But he is not leaving the business. He expects to be an active oil man for years to come.

His popularity is attested by the many tributes paid him as his official retirement nears — gifts, certificates, resolutions, and letters of esteem and good wishes.

To these were added tributes from the regulatory officials of many states, most of whom he has fought and criticized severely in public hearings for many years.

Such an unusual send-off testifies to the unusual career of an unusual individual.

The crude-oil business is an unusual business and Ralph Dietler pretty much made it what it is today.

He entered it in Denver in 1919 with Midwest Refining Co. about the time that company was taken over by Standard of Indiana. He was moved to Tulsa in 1931 when the Indiana company organized Stanolind Crude Oil Purchasing Co., now Stanolind Oil Purchasing Co. He was president from 1940 to 1948 and has been chairman of the board since then.

Here was the great "Indiana octopus" purchasing thousands of barrels of crude oil daily from competitors and independent producers. Dietler's job was to buy it as cheaply as possible.

But he decided that he also had two other jobs. One was to give his company a reputation for constructive progress in the industry and the communities where it operated. The other was to help independent producers remain strong and prosperous.

**NEVER WITHOUT** a carnation, Dietler had to wear two at the Austin party. The reasons: (1) Everybody else was wearing one, and (2) both were sent by secretaries of competitors.

The remarkable thing is that he accomplished all three objectives by methods heartily disapproved by Dale Carnegie. By nature Dietler is rough, gruff, brusque, outspoken, and undiplomatic. He always says what he believes to be the truth, no matter how unpopular. And time usually proved him right.

But his hard-boiled manner was merely a cloak for a warm heart and a genuine love of people.

**Gruff, but helpful . . .** "Many times Ralph came to my rescue when I needed to buy or sell crude and couldn't get help anywhere else," said one of his smaller competitors.

"He always figured out some way to solve my problem, but he always started out by insulting me and bawling me out. It used to make me pretty mad until I realized he was usually right."

Another friend commented: "Once I served on a civic group of which Ralph was chairman. At the first meeting he systematically insulted every one of us individually. But in the end he got more work out of us than any chairman before or since."

Similar expressions were made by state regulatory officials whose respect for Dietler was highlighted by the outspoken scorn he heaped on them so frequently. Dietler consistently plugged for conservation and market-demand proration, insisting that the entire industry would be better off if producers would hold part of their oil in the ground until the market was ready to take it at a fair price.

**Official comment . . .** "A voice in the wilderness, pointing a distasteful way we knew was right but were not ready to recognize," was the description of Chairman William J. Murray, Jr., of the Texas Railroad Commission.

His colleague, Olin Culberson, put it this way: "Many a time he has stood up in our hearings and let us know that everything we had said and done was just as wrong as hell. His philosophy is that cooperation that doesn't strike fire occasionally is only for mollycodles."

A sly dig at Dietler's constant complaint of overproduction was included in Commissioner John B. Hussey's tribute at his last appearance before a Louisiana proration hearing.

"I understand," Hussey said, "that Ralph Dietler purchased the first barrel of crude produced by the Drake well, and that he asserts that that same barrel of oil is still in storage in Whiting due to overproduction ever since."

Probably not everyone whom Dietler infuriated forgave him completely, but all respect him for his integrity, his knowledge, and his achievements. Some of his employes describe him as a perfectionist, a detailist, and a slave driver. He insisted that everyone in the company try to improve himself. He often gave employes a book "How to Think;" some were insulted, others took the hint and benefited.

A voracious reader, Dietler made himself a real student of conservation, state regulation, and over-all supply and demand conditions in the industry.

As a part of his program, Dietler has been a big supporter of the Interstate Oil Compact Commission. He attends virtually all meetings and keeps urging the industry to take part in committee activities.

He also attends most meetings of producers throughout the Mid-Continent, Southwest, and Rocky Mountain regions, simply for the purpose of making and maintaining personal acquaintanceship with independents with crude to sell.

Next week Ralph Dietler opens his own office in Tulsa as an oil consultant. "They can't keep me out of a business I've been in all my life," he growls. "I'm not retiring—just changing bosses."

## A New Oil Boom Is in the Making . . .

LOS ANGELES.—Another town lot drilling boom in the Los Angeles Basin is shaping up in the Sunset Heights area of the Sunset Beach field. Last reports show 23 rigs operating in the field, either deepening existing producers or drilling new wells.

And even while this drilling boom is getting under way, per-well production is dropping rapidly. Production from some of the first wells completed in the 7,800 ft. pool have declined more than 50 per cent from their original flow rates in excess of 2,500 bbl. daily.

Efforts by the Conservation Committee of California to persuade operators to adopt conservation recommendations have been unsuccessful. Because of the extremely competitive situation resulting from the state's lack of conservation laws, wide-open flow practices are being followed. Drilling density is expected to reach one well per 1.5 acres.

So far, nine wells have been completed in the fault block zone discovered last October by the Superior Oil Co. 1 Halbrook-Isabel-Howard. This well was completed for 1,430 bbl. daily from the perforated interval 7,728-53 ft.

Production figures of wells completed in this zone are not available. As of December 4, however, 9 wells in the Sunset Heights area were producing 6,215 bbl. daily. December 11 figures show 13 wells, of which three were pumping, producing 8,420 bbl. daily. On December 18, the 17 wells were producing 9,000 bbl. daily. The per well production has declined from 650 to 530 bbl. daily.

## . . . But Will It Be Another Jones Pool?

LONG BEACH. — The Jones sand pool in southern Huntington Beach apparently is running its course in 1 year.

Authorities estimate two-thirds of the oil reserve credited to this discovery is being brought up in the first 12 months of operation. Discoverd at the first of the year, the 3,700 to 4,000-ft. pool contained 200 wells as the year closed. Aside from one well slanted underneath an offshore state lease, all are confined to a townlot area of approximately 85 acres.

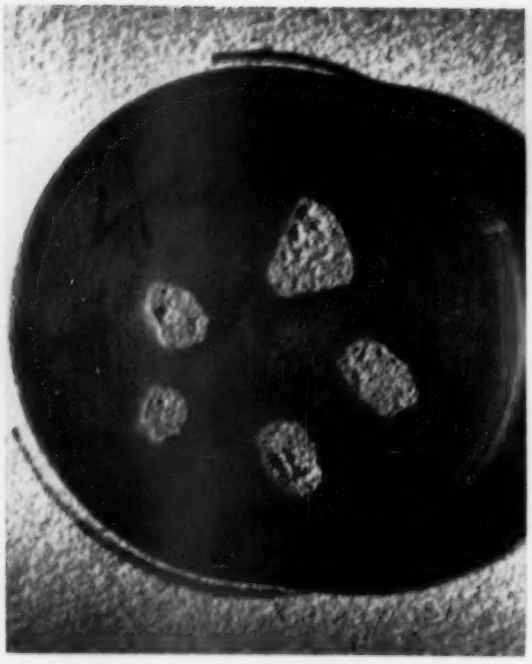
Daily per-well production during the first month's operation was 380 bbl. Because of dense drilling and high withdrawal rates, the average rapidly declined to 76 bbl. Currently it is less than 20 bbl. daily.

Average cost of these wells is about $60,000. So operators have invested something like $12,000,000 in drill sites, hole, and producing equipment. All will not get their money back, since the gross 1955 income will be only about $5,400,000. High royalties and lifting and trucking costs mean only some $2,000,000 of this income is available for paying off drilling costs.

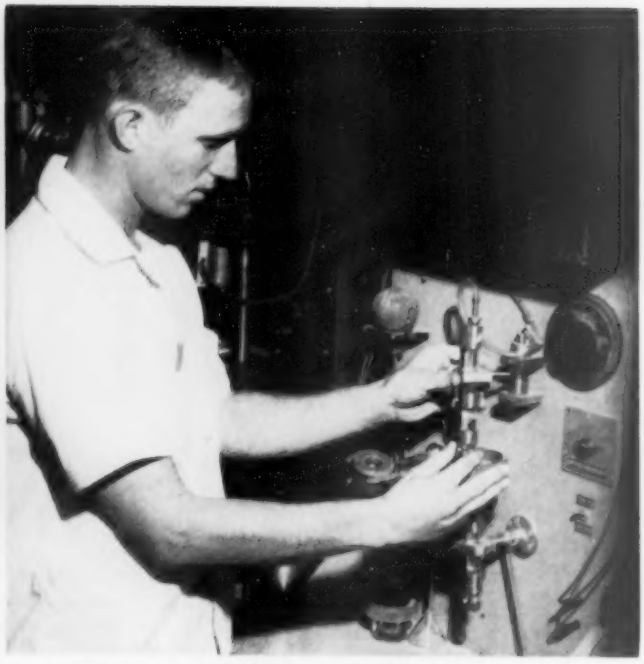
Ultimate production is estimated at about 3,250,000 bbl. so it is readily apparent that late comers will not recover costs of their wells.

**RISE AND FALL OF THE JONES POOL**

| | Oil prod., bbl. daily | Prod. wells | Comp. | Av. prod. bbl. daily | Monthly prod. |
|---|---|---|---|---|---|
| Jan. | 2,806 | 19 | 19 | 380 | 86,982 |
| Feb. | 5,358 | 50 | 31 | 184 | 150,035 |
| March | 8,579 | 96 | 48 | 119 | 265,938 |
| April | 9,227 | 154 | 56 | 76 | 216,800 |
| May | 8,589 | 182 | 30 | 51 | 266,254 |
| June | 7,826 | 190 | 11 | 43 | 234,772 |
| July | 6,262 | 194 | 2 | 33 | 194,135 |
| Aug. | 5,815 | 196 | 1 | 30 | 180,263 |
| Sept. | 4,760 | 195 | 0 | 25 | 142,811 |
| Oct. | 4,473 | 198 | 3 | 23 | 138,667 |



SMALL ROCK FRAGMENTS are fixed in plastic, then exposed by sanding and flushed with brine. Disk is about ¾ in. in diameter.



LAB TECHNICIAN inserts the sanded disk in a brine-resistivity cell to measure resistance. Data helps determine whether oil is present in the zone in commercial quantities.

## *Atlantic technologists discover:*

# . . . How to Find Oil in (Some) Dry Holes

**Robert J. Enright**

DALLAS.—Memo to oil producers: Don't faint if someone comes around wanting to buy that duster you drilled back in the 30's. It could happen.

A good many people are interested in dry holes these days. They haven't taken leave of their senses, either. It's not the dry hole that's so interesting, but the fact that it really might not be dry.

Atlantic Refining Co.'s research lab in Dallas has come up with a new technique which may turn a good number of old dry holes into producing wells.

The method is based on the physical fact that underground formations and the fluids they contain show varying resistances to the passage of electrical current.

For example, a zone of high resistance on an electric log usually indicates dense rock or a porous formation containing oil. A shale-free zone of low resistance generally means a porous water zone.

Atlantic has collected formation-water samples over the country for years. It has measured resistivity of the water and charted the samples as to depth and geologic age, until now it has a veritable library of water-resistivity values.

Resistivity as shown by an electric log reading, however, is due to a combination of the rock's pore structure, the water resistivity, and the amount of oil and water present. Knowing just the water resistivity isn't enough to spot oil. Rock porosity and formation resistivity are needed, too. The effect of rock porosity on formation resistivity is called the "formation factor."

Atlantic has developed and patented a method for determining the needed formation factors from extremely small rock samples.

Water resistivity and formation factor are weighed against the true resistivity of the formation (derived from the electric log) in an equation which tells how much, if any, oil is in the formation.

If the oil saturation is around 60 to 70 per cent, chances of making a producer from the zone are good.

**The formation factor . . .** The patented process for obtaining the formation factor is simple and straightforward.

Rock fragments, which need be no larger than a match head, are mounted in lucite plastic disks roughly ¾ in. in diameter. The disks usually contain from three to six fragments. The disk is sanded on both sides until the fragments are exposed, then it is flushed and saturated with brine.

Resistance measurements are taken with the disk inserted in a brine resistivity cell. Area and thickness measurements are made of the cuttings, and the formation factor calculated.

**How it is applied . . .** The entire procedure starts off with the scanning of an electric log of an old hole.

The scanner may find one or two or more zones of high resistance which look interesting. He then checks water resistivity values in the area.

If the zones still look promising, he gets formation samples and measures the formation factor. The equation is applied, and the analyst has a good idea whether oil is there and how much.

There is, of course, possibility of error in this process. It's impossible to know for sure that whoever pulled sample when the well was drilled got a good one. The sample might be of a zone just above or below the one found promising and the depth recorded wrong. The sample might have been mistakenly tagged during warehouse

handling. A mistake might also have been made in obtaining true formation resistivity or water resistivity.

Atlantic research men figure it will be right often enough, however, to find a lot of oil overlooked when old wells were drilled. Electric logs in those days weren't what they are today. And even where an electric log indicated something promising, zones were sometimes passed up because of a preconceived or traditional notion that this formation never had yielded oil in the area and therefore never would.

Completion techniques have advanced a long way in recent years, too. And a noncommercial pay several years ago might well be a lucrative one today.

Atlantic's new technique, though promising for use in old wells, isn't believed by company technicians to be feasible for new drilling ventures, since new logging techniques can yield the same information more quickly and reliably.

## Wyoming Field Reopened

LOVELL, Wyo.—Spence Dome oil field in Wyoming's Big Horn basin has been reopened by Western Giant Oil Co., Inc., of Dearwood, S. D. The field had been shut in since July 1952.

Six shallow wells were put on electrical pumps. The company plans a drilling program for 1956 to expand the field.

Spence Dome is 23 miles southeast of here and about 60 miles northwest of the prolific Bonanza field. It was discovered in 1914 with the C. C. Landes well. Production is from the Madison sand at about 500 ft. The crude is asphaltic base with a gravity of 18.3°. Development of the field was retarded for years by the low-priced, low-gravity oil. However, demand has picked up recently for the black oil.

## Conoco Pipeline Completed

DENVER. — Expansion of Continental Pipe Line Co.'s crude line between Guernsey, Wyo., and here will be completed this week.

The project includes a 24-mile, 8-in. pipeline loop between Guernsey and Horse Creek, Wyo.; new storage tanks at Guernsey; an electric booster station near Ault, Colo.; and new pumping units at Chugwater, Wyo., and Horse Creek. Completion of the project will boost capacity of the line to 50,000 bbl. daily into Cheyenne and to 32,000 bbl. daily into Denver.

The Ault booster station will be operated by remote control from Horse Creek. Operating data will be recorded at Horse Creek by means of telemeter.

# WATCHING WASHINGTON

**Bertram F. Linz**

## New Ground Rules Abroad

American business men in Europe complain the Government's effort to apply our antitrust laws to foreign operations is working against the best interests of the United States.

They say, in effect, that they are playing in the other fellow's ball park and have to follow his ground rules. And foreign governments aren't in any hurry to change their laws to suit outsiders.

What these business men think was laid out last week in a report released by Sen. Harley M. Kilgore of West Virginia. He is chairman of a Senate antitrust and monopoly subcommittee and made a trip this fall to talk to Americans in England, France, and Italy.

The American Chamber of Commerce in London expressed some caustic views. It cited the Iranian consortium as an example of how our antitrust laws are making things tough.

"It said that recent decisions have added to, rather than dispelled, the confusion and uncertainties of our laws as they are applied to operations abroad," Kilgore's memorandum said. "It believes the antitrust difficulties of the Persian consortium illustrates these uncertainties and the extreme attitude of the Department of Justice"

It's no answer to say that "reasonable" restraints abroad are permitted. Nobody is in a position to say what is reasonable, it said.

In the opinion of the chamber, no halfway measures can remove this confusion and uncertainty. Only a simple, clear-cut rule that acts performed abroad are beyond the scope of our law will enable our nationals to increase our trade and investments abroad.

## Bloom Off the Boom?

This is the time of year when our leading business men, economists, Government officials and columnists come up with their predictions whether business will or will not prosper over the next 12 months.

So it is in order to say that the National Planning Association forecasts that our economy will continue to expand in 1956.

The important thing about the N.P.A.'s crystal ball-gazing is the warning that the expansion will be at a much slower rate than in 1955.

This year, gross national product rose more than $30,000,000,000 from the recession level of the third quarter of 1954 to the full employment level of the third quarter of 1955. If no deterring factors develop, it may increase by another $10,000,000,000 next year. That's only a third of the 1955 gain, but it will be enough to maintain full employment.

The principal factors which made for unexpectedly rapid recovery from the 1954 setback were the reversal of inventory liquidation to a rapid rebuilding of inventories; the spectacular rate of automobile production and sales; the rise in business investment in plant and equipment, and heavy residential construction.

Next year, automobile sales are not expected to increase much over 1955. Inventory building is not likely to make the same support to business activity. Consumer spending is likely to level off.

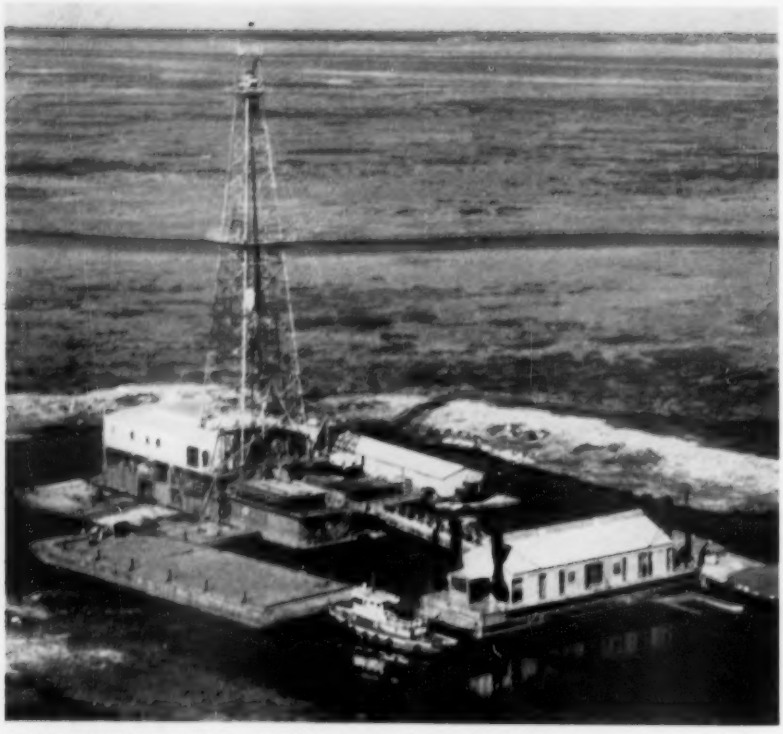
## Price Wars Invite Curbs

If the industry can't do it, the Government may step in to stop gasoline price wars.

Divorcement or some form of federal regulation may be the answer to dealer complaints over suppliers' practices, according to Sen. Hubert Humphrey of Minnesota. Humphrey is chairman of a Senate subcommittee that has been studying the New Jersey gas price situation.

Humphrey warns top company officials they should work out a program for correcting "cut-throat competition." The company men say it isn't as simple as that. Surplus refining capacity in New Jersey, the entry of another major company (Standard Oil Co. of California), into the market, and the building of "supermarket" multipump stations are factors in the situation.

The companies agree that something should be done. But they insist federal control isn't the answer. They are sure dealers would be worse off under Government regulation than they are now. Many dealers take the same view, but at the same time they say they can't continue to operate under present conditions.



**RICHARDSON & BASS' Rig 25, which lowered the world's drilling depth record to 22,559 ft., may find deepest production, too.**

# Deepest Hole Bottomed

## ● Oil recovery, electric log indicate Richardson & Bass will find production 3,500 ft. below any other producer

PORT SULPHUR, La.—Richardson & Bass has bottomed the world's deepest hole at 22,559 ft.

Chances look good for the Fort Worth operator to bring it in as the world's deepest producer by perhaps a 3,500-ft. margin.

Prospects for an early oil completion improved late last week at the I LL&E-Humble "L," located 35 mi'es southeast of New Orleans in the Mississippi Delta marshes of Plaquemines Parish. Crewmen killed the kick which gave them a bad blowout scare. At last word they were reaming below 20,022 ft.

Oil testing 30.7°-gravity has been circulated out of the hole on two different occasions since drill pipe was first snubbed back into the hole after the well started kicking. The first batch was about 15 bbl. and the second 30 bbl.

Much of the mud recovered from the lower part of the hole has been gas cut. The electric log run to 21,605 ft. also showed several promising formations below 20,000 ft.

These facts improve the odds that the next month and a half will see the world's producing-depth record go to Richardson & Bass and its associates in the venture, John Mecom, Houston independent, and Freeport Sulphur Co. Humble Oil & Refining Co. participated down to 16,000 ft.

**Current records . . .** Present plans call for no more drilling.

At 22,559 ft., the hole is 1,077 ft. deeper than the previous record held by an Ohio Oil Co. well in Kern County, California.

The world's deepest producing well is Shell Oil Co.'s 1 C. B. Patout in the Weeks Island field of Iberia Parish, Louisiana. It makes gas and condensate from 17,558 to 17,584 ft. A short-lived California well is the only one which ever produced from a deeper zone. It made gas and condensate from 17,500 to 17,895 ft.

If the Richardson & Bass well is successfully completed at the most promising interval logged—one topped at 21,520 ft.—it will break the previous mark by more than 3,500 ft.

**How kick was killed . . .** The well began kicking 2½ weeks ago as drill pipe was being pulled.

To kill the well, Richardson & Bass had to snub the drill pipe into the hole to 16,000 ft. At that depth, an 18.5-lb. mud brought it under control. The blowout preventers had been holding against some 2,000 psi. for more than a week.

With the well under control, the crews ran the drill pipe to the bottom of the last string of casing at 19,752 ft. There they conditioned the mud and gradually cut its weight to 18.3 lb.

There had been slight loss of circulation during original drilling of some formations exposed to open hole below 19,752 ft. At the time, mud weight was 18 lb. per gallon and weight must be held close to that figure to cut the danger of losing mud again.

As far as reaming has gone, the walls of the hole and the mud in the hole have been in good shape. It had been feared that long exposure of the mud to the 350° F. temperature at the bottom of the hole would cause gelling or solidification.

**Casing problems ahead . . .** Getting casing to the bottom is going to be a ticklish job.

The trouble is that pumping times of casing-cement slurries are too short for the depth and temperature of the deep well. The operator has already cemented up a string of drill pipe as a result. It happened during attempts to squeeze cement inside the 7-in. liner at about 19,000 ft.

Richardson & Bass plans to overcome this problem by using a recently introduced pozzolanic cement designed specially for deep wells and high temperatures. Developed by Halliburton Oil Well Cementing Co., the material is called Pozmix 140 *(The Oil and Gas Journal, October 17, page 92)*.

The mixture contains no portland cement, only pozzolans, hydrated lime, chemical activator, and retarder. Special laboratory tests on blends for this well show good pumping times.

The operator will try to get pipe into the open hole and cemented as fast as possible. So the oil string will probably start with 5-in. heavy-wall pipe run as a liner to hang out of the existing 7-in. liner. Later, this 5-in. liner will be extended by a patch string all the way to the surface.

Whether the 7-in. liner will also be extended to the surface has not been announced. A 9⅝-in. intermediate string is the smallest one presently extending to the wellhead.

Drilling began on the I LL&E last February 28. With luck, the crews will have brought in the world's deepest producer by that date in 1956. If they miss, it will be a $2,000,000 dry hole.

# Gas Fight Perks Up

## Oil industry leaders aim new blasts at gas distributors; mayors and consumers may be organized to help measure

OIL-INDUSTRY spokesmen are leveling new blasts at the gas distributors in stepping up their campaign to win support for the Harris bill. The measure exempting natural-gas producers from federal controls will be considered in the Senate early next month.

Industry leaders also firmed up their battle lines with these new developments last week:

. . . **Pennsylvania oil men** lined up solidly behind the Harris bill. The Pennsylvania Grade Crude Association meeting at Oil City unanimously approved a resolution supporting the bill.

. . . **Indianapolis Mayor Alex M. Clark** offered to lead one section of the fight. He wrote the Texas Mid-Continent Oil and Gas Association he would form a committee of mayors, consumers, and small oil producers throughout the country and personally direct them "in carrying this fight for freedom to the nation's capitol."

French Robertson, president of Texas Mid-Continent, wrote his members advising them to support Clark's effort. Robertson warned the Harris bill faces rough going because several well-supported groups have organized to pressure Congress. He cited the Council of Local Gas Companies as one of these and termed it a "dangerous force out to wreck the . . . bill" *(The Oil and Gas Journal, December 19, page 42).*

**Issues defined . . .** Position of local gas distributors in the fight came in for some barbed comments from two industry leaders, Leonard F. McCollum, president of Continental Oil Co., and Frank O. Prior, Standard Oil Co. (Ind.) president.

McCollum said the regulated local distributor gets the biggest cut of the consumers' gas bill. The regulated pipeline gets the next biggest cut. The unregulated producer gets the short end. These facts alone, he said, should convince the public that gas producers are not going to get anything like $800 million a year more through passage of the bill.

McCollum added that if gas prices increase by anything like that amount the gas industry would price itself out of the fuel market.

Prior said the Council of Local Gas Companies has defined the battle lines. It is not between consumers and gas producers but between 40 big utilities with local monopolies and 8,000 competing producers in the field.

**Down to cases . . .** The oil man cited the case of Brooklyn Union Gas Co. as an example of how the gas distributors take the largest share of the consumer's dollar.

Prior said Brooklyn Union gets natural gas the producer sold in the field for an average of 7.8 cents M.c.f. Brooklyn Union pays 32.3 cents M.c.f. for pipelining and charges the consumer $2.22 M.c.f. This is a margin of $1.90 an M.c.f. to cover distribution costs and Brooklyn Union's profit.

"Brooklyn Union does nothing to find or develop one cubic foot of natural gas," Prior said. "It does not stand any exploration costs. It does not take any risks. It does not drill any dry holes. It lives off the efforts of those who do take the risks in finding this gas and off the consumers who are so eager to use it in their homes.

"When the consumer addresses his complaints about high gas prices to the producer he has the wrong post-office address."

# Oil Tax Cry Revived

## Wyoming editors stirred by loss of Conoco refinery

GLENROCK, Wyo.—Three Wyoming editors are reviving a campaign for a severance tax on the state's natural resources. They are irritated at the prospect of Wyoming oil being piped out of the state for refining elsewhere.

The tempest was stirred when Continental Oil Co. announced it will shut down its 4,500-bbl. refinery here shortly after January 1.

Continental says it is caught in a switch by the Glenrock plant. The 38-year-old refinery is not large enough to meet the company's growing needs in this area. And the cost of expansion is considered prohibitive *(The Oil and Gas Journal, October 3, page 88).*

The Glenrock Independent says this will result in Wyoming crude, formerly refined by Continental, going out of the state for processing. The Independent is being joined by two other newspapers in an editorial campaign "to establish an equitable tax on one of the state's most valuable and expendable resources." The other newspapers are Platte County Record of Wheatland and the Douglas Enterprise.

This likely will inject the severance tax issue into the state's 1956 political campaign. A proposal for a 2 per cent severance tax was made in the last session of the Wyoming Legislature but died. Gov. Milward L. Simpson has opposed such a tax in the past.

Wyoming has no tax on its natural resource industries. The only production levy on oil is two-fifths of a mill imposed at the wellhead to provide funds to administer the state's conservation law.

# New Field Assured

## Rank wildcat in Mississippi gets good flow of oil, gas

GULFPORT, Miss.—First production along the Mississippi coast was assured last week by production tests in a rank wildcat.

Marshall Young's 1 Cuevas Estate flowed at a rate of 2,600,000 cu. ft. of gas per day with a yield of 96 bbl. of 50° to 55°-gravity green oil.

The wildcat is in Hancock County, 3 miles inland and near the Louisiana border *(For map, see The Oil and Gas Journal, December 19, page 59).*

The well, drilled to 10,924 ft., was perforated at 10,840-51 ft. Flow was from the well's upper Lower Cretaceous sand, believed to be of Washita-Fredericksburg age.

The initial test was through drill pipe, with a packer at 10,804 ft. The flow was through a ¼-in. top and ⅜-in. bottom choke. Flowing pressure was 1,800 psi.

The discovery is believed to be on a possible southwest nosing of the Wiggins anticline, a major east-west trending structural feature across the state's three coastal counties. It is in an almost virgin province for new exploration.

## Shell to Add M.E.K. Unit

NORCO, La.—Shell Chemical Corp. will start building a new M.E.K. plant here early in January. The new unit, Shell's fourth of its kind, will produce 40,000,000 lb. of the petrochemical intermediate beginning in early 1957.

Prospects of growth in the surface coating and vinyl resin industries called for expanding capacity, according to Shell. The company was the first to produce commercial M.E.K. from secondary butyl alcohol. It now operates plants at Martinez and Dominguez, Calif., and Houston.

The new M.E.K. unit will be the latest addition to Shell's Norco petrochemical center, established earlier this year.

# Crude Imports to Keep Climbing in '56

CRUDE imports for the first quarter of 1956 will be at least 10 per cent greater than for the first quarter of 1955.

According to latest company reports filed with the Texas Railroad Commission, crude imports during the first quarter of the year will flow into the U.S. at the rate of about 806,000 bbl. daily. Crude imported by companies not reporting to the commission may raise the total to almost 860,000 bbl. daily. Actual imports of those companies reporting to the Railroad Commission totaled 814,900 in December.

Actual crude imports for the third quarter of this year, as reported by the Census Bureau, exceeded the Commission total by 54,000 bbl. daily.

If reports to the commission, covering the first quarter of 1956, fail to account for as much of the total as they did in the third quarter of this year, the actual imports will reach 860,000 bbl. daily. If the average does reach 860,000 bbl. daily, it will represent a gain of about 16 per cent over the first quarter average reported by the Census Bureau and about 15 per cent over the average of all company reports to the Bureau of Mines.

However, the December reports to the Railroad Commission show a slightly lower average for the first quarter than the November reports. A month ago, reporting companies expected to bring in 811,900 bbl. daily during the first 3 months of next year. But this total was reduced to 805,700 bbl. daily by the latest reports.

**Less products expected . . .** Product imports for the fourth quarter of this year and for the first quarter of 1956 will be less than in the corresponding quarters a year earlier. Despite the loss of some of the seasonal gain in the fourth quarter this year, the reports to the commission show a gain of 8.4 per cent for the full year 1955.

The latest reports to the Railroad Commission show a higher product-import average for the first quarter of 1956 than the reports filed with the commission in November. This gain was due to the fact that Standard Oil Co. (N. J.) reported on an annual basis in November but was able to break the annual average to show quarterly averages in the December report.

Product imports for the first quarter normally average much more than for the full year since residual fuel accounts for a large part of the total and residual demand increases during the winter months.

The fact that Jersey's planned imports for the first quarter exceed the planned average for the year by only 26,000 bbl. daily may indicate a shortage of heavy fuel in refining areas outside this country.

## Here are Companies' Imports Figures

(Thousands of barrels daily)

| | Actual* | | Estimated or forecast | | | | |
|---|---|---|---|---|---|---|---|
| | Nov. 1954 | Nov. 1955 | Dec. 1955 | Jan. 1956 | Feb. 1956 | Mar. 1956 | Apr. 1956 |
| CRUDE—EAST COAST: | | | | | | | |
| Atlantic Refining Co. | 64.9 | 57.8 | 66.6 | 66.6 | 66.6 | 66.6 | 66.6 |
| Cities Service Co. | 23.8 | 40.5 | 16.4 | 22.8 | 27.4 | 23.2 | 30.8 |
| Eastern States Petroleum Co. | 6.4 | 24.2 | 17.5 | 19.5 | 19.5 | 19.5 | 19.5 |
| Gulf Oil Corp. | 104.0 | 113.0 | 151.0 | 125.0 | 126.0 | 125.0 | 130.0 |
| McBride Oil & Gas Corp. | 7.5 | | | 3.2 | 6.9 | 6.5 | 6.6 |
| Phillips Petroleum Co. | 6.1 | 6.4 | 9.7 | 9.7 | 10.4 | 9.6 | 10.0 |
| Sinclair Oil Corp. | 57.9 | 75.7 | 70.0 | 68.8 | 68.8 | 68.8 | 70.0 |
| Shell Oil Co. | | 1.8 | 2.0 | 2.2 | 2.3 | 2.5 | 2.6 |
| Socony Mobil Oil Co. | 73.9 | 65.8 | 63.0 | 64.5 | 64.5 | 64.5 | 66.5 |
| Southwestern Oil & Refining Co. | 0.5 | 3.8 | 3.6 | 3.7 | 3.9 | (¶) | (¶) |
| Standard Oil Co. of California | 61.9 | 66.8 | 79.7 | 79.7 | 79.7 | 79.7 | 79.7 |
| Standard Oil Co. (Ind.) | 14.8 | 13.0 | 19.3 | 3.3 | 14.4 | 13.1 | 13.5 |
| Standard Oil Co. (Ohio) | | 3.3 | 3.3 | | 1.5 | 1.5 | 1.5 |
| Standard Oil Co. (N.J.)† | 79.0 | 78.0 | 79.0 | 79.0 | 79.0 | 79.0 | 79.0 |
| Sun Oil Co. | 23.0 | 25.1 | 32.1 | 25.9 | 33.4 | 26.6 | 27.5 |
| The Texas Co. | 56.2 | 69.0 | 79.5 | 65.5 | 65.9 | 75.7 | 45.0 |
| Tide Water Associated Oil Co. | 12.2 | 13.1 | 15.3 | 15.0 | 15.0 | 15.0 | 15.0 |
| Total East Coast | 592.1 | 657.3 | 707.9 | 654.4 | 685.2 | 680.4 | 667.4 |
| CRUDE—WEST COAST: | | | | | | | |
| Shell Oil Co. | | 17.6 | 23.2 | 30.9 | 37.9 | 18.0 | 18.7 |
| Socony Mobil Oil Co. | 18.1 | 21.2 | 31.0 | 26.5 | 26.5 | 31.5 | 31.5 |
| Standard Oil Co. of California | | 26.1 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 |
| The Texas Co. | 10.3 | 23.1 | 5.0 | 5.7 | 7.9 | | 28.7 |
| Tide Water Associated Oil Co. | 5.5 | 20.7 | 29.8 | 51.4 | 38.7 | 68.7 | 26.2 |
| Total West Coast | 33.9 | 108.7 | 107.0 | 132.5 | 129.0 | 136.2 | 123.1 |
| Total crude | 626.0 | 766.0 | 814.9 | 786.9 | 814.2 | 816.6 | 790.5 |
| PRODUCTS: | | | | | | | |
| Asiatic Petroleum Corp. | 1.1 | 2.5 | 3.6 | 4.3 | 4.6 | 4.6 | 4.5 |
| Eastern States Petroleum Co. | 20.0 | 11.2 | 18.3 | 15.0 | 10.0 | 10.0 | 10.0 |
| Gulf Oil Corp. | 6.0 | 8.0 | 11.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| Shell Caribbean Petroleum Co.‡ | 137.0 | 133.0 | 174.0 | 165.0 | 170.0 | 145.0 | 110.0 |
| Shell Oil Co. | 25.7 | 22.6 | 16.9 | 28.0 | 24.1 | 24.2 | 20.3 |
| Sinclair Oil Corp. | | 2.7 | | | | | |
| Socony Mobil Oil Co. | 7.3 | 13.4 | 13.6 | 9.1 | 9.1 | 9.1 | 9.1 |
| Standard Oil Co. (Ind.)§ | 18.7 | 26.1 | 40.6 | 39.7 | 36.0 | 28.6 | 26.7 |
| Standard Oil Co. (N.J.)† | 195.0 | 183.0 | 197.0 | 195.0 | 195.0 | 195.0 | 177.0 |
| The Texas Co. | 3.4 | | | | | | |
| Total products | 414.2 | 402.5 | 475.0 | 463.1 | 455.8 | 423.5 | 364.6 |
| Total crude and products | 1,040.2 | 1,168.5 | 1,289.9 | 1,250.0 | 1,270.0 | 1,240.1 | 1,155.1 |
| Bonded fuel included‖ | 65.9 | 79.3 | 78.9 | 75.4 | 75.6 | 75.2 | 77.3 |

*From company reports to the Texas Railroad Commission. †Based on quarterly estimates. ‡Imported by independent distributors. §Received through suppliers who can furnish either domestic or foreign oil. ¶Unreported by company but an average of 3,600 bbl. included in totals. ‖Mostly duty free for bunkering ships in foreign trade.

**CRUDE IMPORTS***

(Thousands of barrels daily)

| | 1954 | 1955 | Per cent change |
|---|---|---|---|
| First three quarters | 639.9 | 740.4 | 15.7 |
| October | 656.1 | 795.2 | 21.2 |
| November | 626.0 | 766.0 | 22.4 |
| December | 720.2 | 814.9 | 13.1 |
| Fourth quarter | 667.9 | 792.3 | 18.6 |
| Year | 647.0 | 753.5 | 16.5 |

| | 1955 | 1956 | Per cent change |
|---|---|---|---|
| January | 716.8 | 786.9 | 9.8 |
| February | 747.3 | 814.2 | 9.0 |
| March | 721.4 | 816.6 | 13.2 |
| First quarter | 727.9 | 805.7 | 10.7 |
| April | 669.4 | 790.5 | 18.1 |

**PRODUCT IMPORTS**

(Thousands of barrels daily)

| | 1954 | 1955 | Per cent change |
|---|---|---|---|
| First three quarters | 314.5 | 359.6 | 14.3 |
| October | 328.2 | 287.1 | —12.5 |
| November | 414.2 | 402.5 | — 2.8 |
| December | 485.1 | 475.0 | — 2.1 |
| Fourth quarter | 409.1 | 388.0 | — 5.2 |
| Year | 338.4 | 366.8 | 8.4 |

| | 1955 | 1956 | Per cent change |
|---|---|---|---|
| January | 508.1 | 463.1 | — 8.9 |
| February | 519.0 | 455.8 | —12.2 |
| March | 451.8 | 423.5 | — 6.3 |
| First quarter | 492.0 | 447.3 | — 9.1 |
| April | 356.9 | 364.6 | 2.2 |

*From reports to the Texas Railroad Commission.

*Everything's rosy, almost . . .*

# . . . Industry Ending Record Year

NEW YORK.—The past year has seen records set in all phases of the oil industry except one.

Domestic demand exceeded 3 billion barrels for the first time. The average was 8,363,000 bbl. per day—above the 8,000,000-bbl. mark for the first time with an increase of 7 to 8 per cent.

Exports of 373,000 bbl. daily raised total demand to another new record, 8,736,000 bbl. per day, according to the annual summary by the American Petroleum Institute.

Domestic production rose to 6,766,000 bbl. per day compared with 6,346,000 bbl. per day last year. Imports advanced 184,000 to 1,236,000 bbl. per day and natural-gasoline production was up from 681,000 to 720,000 bbl. per day, lifting total U. S. supply to a record 8,722,000 bbl. per day.

Drilling also was at a record pace, A.P.I. President Frank Porter reported. Total well completions for 1955 were up 6.6 per cent to an all-time high of over 57,600.

**Gas wells decline . . .** The one fly in the ointment was gas-well completions.

Porter noted that the number of gas wells drilled dropped 9.4 per cent from last year's peak of 3,974 to 3,600 this year.

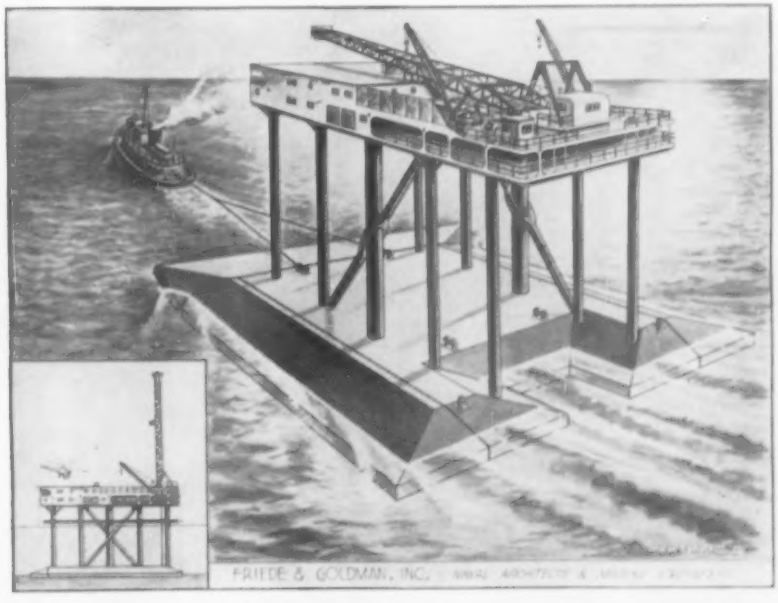
Porter pointed to warnings from the oil industry that the price-fixing effects of the Phillips case could seriously retard the search for natural gas, despite the great demand, unless Congress frees independent producers from federal regulation.

This would be accomplished by the Harris bill, approved by the House, and the Fulbright bill, due to come before the Senate early next year.

While drilling for gas wells dropped off, natural-gas production increased 875 billion cubic feet to a gross of 11 trillion, 860 billion cubic feet.

Output of distillate and residual fuel oils established another first, exceeding a billion barrels. Yet residual fuel alone continued to decline in the face of refiners' concentration on producing lighter products. Heavy fuel demand, as a result, was greater than the supply.

The summary noted that refinery capacity reached 8,535,000 bbl. per day, up 114,000 bbl.




## New Barge Will Drill Deep in Deep Water

MOBILE, Ala.—A drilling barge capable of drilling three wells in 67 ft. of water to a depth of 20,000 ft. without moving location is being built here.

Alabama Dry Dock & Shipbuilding Co. is building the vessel for Coral Drilling Co. It is expected to be put into service in the Gulf of Mexico next summer.

When the barge is in operation, its lower hull will store fuel oil, water, dry mud, and cement. The dry mud and cement will be blown from the submerged hull to the drilling platform.

An adjustable derrick will be stationed on the barge, permitting three holes to be drilled without moving the vessel. Mud pumps, draw works, and rotary table will be electrically driven.

## High Flow Retained

### January allowable set at 3,275,891 bbl. in Texas

AUSTIN.—The Texas Railroad Commission had a look at cold-weather reports and favorable levels of crude and product levels. The results: an order maintaining the present high 17-day crude-producing allowable rate.

The initial January allowable, 3,275,891 bbl. daily, is 21,328 bbl. daily higher than the allowable as of December 3 due to new wells.

Recommendations of purchasers were split fairly evenly. Five favored 17 days and five 16 days. Shell Oil Co. recommended only 15 days, while H. P. Nichols, Tyler, Tex., asked for 18.

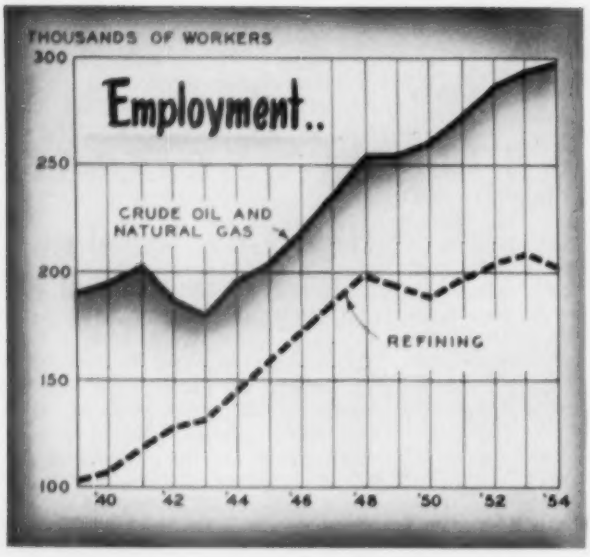
Commissioner Olin Culberson gave the commission a figurative pat on the back. He noted that current production of 2,849,000 bbl. daily (as estimated by the Bureau of Mines) missed the allowable by only 12 gal. per well.

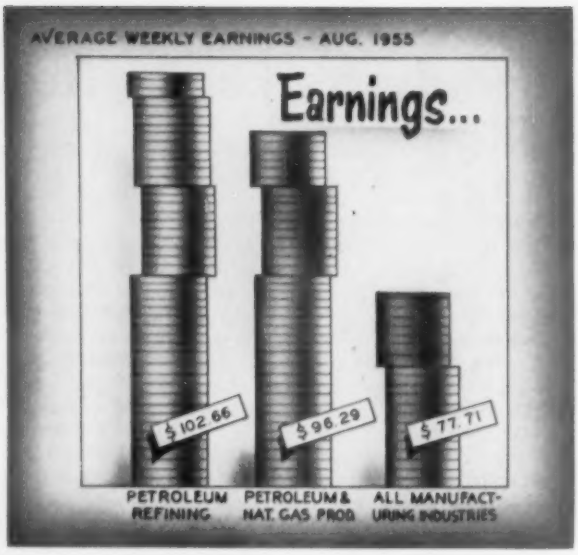
The commission's initial order for January retained the sharply reduced 5-day allowable for Jameson (Strawn) field of Coke County, West Texas. Jameson production was curtailed the first of December to halt flaring of about 35,000,000 to 45,000,000 cu. ft. of casing-head gas daily.

The field had outlet for only 15,000,000 cu. ft. daily through a Lone Star Gas Co. line from the Sun Oil Co. gasoline plant in the field. El Paso Natural Gas Co. is laying a line into the field which will take up to 40,000,000 cu. ft. of gas daily from Texas Hydrocarbon Co.'s natural-gasoline plant. The field will go back to the state-wide pattern, when this line is completed early in January.

**TEXAS' JANUARY ALLOWABLE**
(Barrels per calendar day)

| District— | January | Change from Dec. 3 |
|---|---|---|
| 1—Southwest | 55,172 | + 794 |
| 2—Gulf Coast | 158,109 | + 216 |
| 3—Gulf Coast | 486,961 | + 791 |
| 4—Southwest | 262,930 | + 509 |
| 5—East Central | 57,470 | + 143 |
| 6—Outside E. Texas field | 137,031 | +1,047 |
| 6—E. Texas field | 226,320 | — 423 |
| 7-B—N. Cent. Texas | 194,420 | +2,133 |
| 7-C—W. Cent. Texas | 187,975 | + 402 |
| 8—West Texas | 1,103,301 | +4,911 |
| 9—North Texas | 278,197 | +8,278 |
| 10—Panhandle | 128,005 | +2,527 |
| Total | 3,275,891 | +21,328 |




*Oil employment at near-peak level . . .*

# Payrolls High; So Are Wages, Output

**R. J. Rosenthal and S. Swerdloff***

WASHINGTON. — Employment in the oil industry is near peak levels. Wages are among the highest in American industry. Productivity in the field and plant is high.

This is the picture revealed by a special statistical study made by the Bureau of Labor Statistics, Department of Labor.

Oil companies employ 309,000 wage and salary workers in crude-oil and natural-gas production. That is a new record for this segment of the industry. It was taken last August. Since August is generally a high employment month, it is considered a good measure of the year's employment activity.

The 1955 payroll is 17 per cent higher than for the same period in 1950, and nearly 60 per cent higher than in 1940. Over the past 15 years, employment in production has increased about 4 per cent a year except for a few occasional slight dips.

The economic study shows that riding along with peak employment is record production. The year also will be a banner one for wells and total footage drilled, as well as total crude oil produced.

**Top wages . . .** Pay for non-supervisory production workers continues to rank in the top bracket of American industry.

Average weekly earnings for these workers in September 1955 are $96.29 for a work week of 40.8 hours. The average hourly rate is $2.36. This compares with average weekly earnings of $77.71 and average hourly earnings of $1.90 for production workers in other manufacturing industries.

Only dramatic changes in geographical location of workers has occurred in North Dakota and Colorado. Exploration and drilling activity has greatly expanded in those states, attracting large numbers of workers. Sharp declines in employment are noted in Pennsylvania and West Virginia since 1947.

More than 80 per cent of the workers in crude oil production are em-

*Labor economists, Branch of Industry Studies, Bureau of Labor Statistics, Department of Labor.

## Growth Chart for Oil Industry Employment

| | Petroleum refining | | Crude petroleum and natural-gas production | |
|---|---|---|---|---|
| Year | Workers | Per cent 1939 base | Workers | Per cent 1939 base |
| 1939 | 103,700 | 100.0 | 188,800 | 100.0 |
| 1940 | 111,000 | 107.0 | 193,600 | 102.5 |
| 1941 | 121,100 | 116.8 | 201,200 | 106.6 |
| 1942 | 129,600 | 125.0 | 187,100 | 99.1 |
| 1943 | 132,600 | 127.9 | 180,500 | 95.6 |
| 1944 | 145,500 | 140.3 | 197,800 | 104.8 |
| 1945 | 159,600 | 153.9 | 205,600 | 108.9 |
| 1946 | 173,500 | 167.3 | 220,200 | 116.6 |
| 1947 | 189,300 | 182.5 | 237,300 | 125.7 |
| 1948 | 196,600 | 189.6 | 261,700 | 138.6 |
| 1949 | 191,600 | 184.8 | 254,400 | 134.8 |
| 1950 | 185,400 | 178.8 | 254,200 | 134.6 |
| 1951 | 198,600 | 191.5 | 271,600 | 143.9 |
| 1952 | 201,600 | 194.4 | 289,800 | 153.5 |
| 1953 | 206,300 | 198.9 | 297,400 | 157.5 |
| 1954 | 203,600 | 196.3 | 298,800 | 158.3 |
| 1955: | | | | |
| January | 201,600 | 194.4 | 293,600 | 155.5 |
| February | 199,700 | 192.6 | 293,200 | 155.3 |
| March | 200,200 | 193.1 | 295,600 | 156.6 |
| April | 200,200 | 193.1 | 295,300 | 156.4 |
| May | 200,500 | 193.3 | 297,300 | 157.5 |
| June | 202,600 | 195.4 | 306,300 | 162.2 |
| July | 204,100 | 196.8 | 308,300 | 163.3 |
| August | 204,200 | 196.9 | 309,400 | 163.9 |
| September | 202,000 | 194.8 | 304,900 | 161.5 |

Source: BLS, U. S. Department of Labor. 1939 = 100 per cent.

ployed in eight states: Texas, Oklahoma, Louisiana, California, Kansas, Illinois, New Mexico, and Wyoming. This parallels production-drilling activity.

**They stay in the refineries . . .** A similar economic picture—although more stable—is painted for petroleum refining.

Employment has leveled off during the last 7 or 8 years, reaching 204,000 wage and salary workers last August. This is slightly below the same month in 1954 and almost 6,000 below the all-time high reached in August 1953. Employment doubled in the years between 1939 and 1948 but has risen only about 3 per cent since 1948.

The productivity of petroleum refineries, however, has far outstripped the employment figures. Refinery capacity has increased about 30 per cent since 1949 and output about 40 per cent. This reflects greater efficiency of new plants and increase in instrumentation and other labor-saving devices.

Workers in refineries have not suffered at the pay table, however. Wages average $102.66 for a work week of 40.9 hours. The average hourly earnings are $2.51.

It is significant to note that refining has the lowest labor turnover rate among major manufacturing industries. Labor turnover, as used in BLS statistics, refers to gross movement of workers into and out of employment status with respect to individual firms during a calendar month. It might serve as a criteria of stability of both employment and employes within an industry. The separation rate of oil refining is 0.9 per 100 employes. It is less than one-fourth as high as the average for all manufacturing industries.

Ten states employ almost 90 per cent of the refinery workers. Since 1950, Texas and California have registered increases of about 10 per cent. Indiana and Ohio have smaller increases, and other refining states have had decreases. On the basis of anticipated additions to capacity, employment can be expected to increase in Indiana, Illinois, California, Washington, and Texas.

**Fewer pipeline jobs . . .** The petroleum pipeline industry reveals a mixed picture: Employment down. Business up.

Latest figures show employment in 1954 has declined to the lowest level since 1946 in pipelining. In 1948 workers totaled 28,600. It has slowly dropped to 25,800 in 1954.

Significantly, while employment declines, the number of barrels of oil transported increases by more than 50 per cent.

**GOOD OUTLOOK for waterflooding Greater Clareton field is given in report by W. L. Horner (background) of Core Laboratories as Wyoming Conservation Commission members listen. They are, left to right, Gov. Milward Simpson, State Land Commissioner Ben Cossman, and Asst. Atty. Gen. Howard B. Black.**

# Time of Decision for Clareton

CHEYENNE, Wyo.—The Wyoming Oil and Gas Conservation Commission is taking a long look at a proposed $10-million, water-flood program to extend the life of Greater Clareton field.

W. L. Horner, managing consultant and vice president of Core Laboratories, Dallas, Tex., told the commission a combined gas and water-injection project would increase production by 29,500,000 bbl. of oil.

Core Lab surveyed the field under contract with the commission *(The Oil and Gas Journal, December 5, page 80).*

Horner recommended that six pilot injection projects, costing an estimated $300,000, be started as soon as possible to determine the value of a water-injection program. The Cheyenne River area was excluded from the suggested flood because of thickness of sand and advanced development.

Feasibility of a gas-injection program in Clareton field was questioned by Clyde H. Doerr, Oklahoma City oil engineer, and Jerry O'Dell, president of Mountain Valley.

In Doerr's opinion gas injection would simply cause a gas cap and thus hinder production of additional oil. O'Dell cited a separate Core report to his company which said gas injection would not result in increased oil production to any great degree.

**Shut in extended . . .** The commission later continued until January 16 its order shutting in all wells in Greater Clareton producing more than 5,000 cu. ft. of gas per barrel of oil. The order was relaxed to exempt regions outside the Greater Clareton area.

**Plants talked . . .** The hearing next month will consider hardships resulting from the order and special problems in the Cheyenne River area. Two competing firms — Tri-Co-Gas and Mountain Valley Gas Corp.—are building natural-gas extraction plants in Cheyenne River.

Tri-Co-Gas announced to the commission it would spend another $2 million for three additional natural-gas extraction plants in the field if a permanent gas supply is assured. A company spokesman said, however, the offer would be withdrawn if the commission discontinues its ban on excessive gassers.

Tri-Co-Gas expects to have its plant now under construction in operation by January 22.

Its capacity will be 5,000,000 cu. ft. daily. The three additional plants could be completed by October 1956.

# Mexican Gas Sparks Project

## • Texas Eastern plans 422-mile line, 530 miles of looping for Rio Grande to New Jersey system

SHREVEPORT.—Unless Uncle Sam says no, the first flow of Mexican natural gas should reach the New Jersey area within a year.

Texas Eastern Transmission Corp. applied to the Federal Power Commission last week for authority to expand its system to care for the imports. Two major projects are planned in the $150 million program:

**. . . A 422-mile, 30-in. trunk line** from McAllen, Tex., on the Rio Grande to Beaumont.

**. . . 530-miles of 30-in. loops** on its existing system from Kosciusko, Miss., to Uniontown, Pa.

In addition Texas Eastern will build five new compressor stations totaling 50,000 hp. and enlarge existing stations by 20,780 hp.

It also will lay about 45 miles of 24-in. line from Provident City, Tex., to connect in Matagorda County, Texas, with the 30-in. extension to Mexico. This will tie the Wilcox Trend Gathering System into the trunk system.

The new facilities will permit Texas Eastern to deliver an additional 250,000,000 cu. ft. daily of gas to its eastern seaboard customers. The company recently contracted with Petroleos Mexicanos for about 200,000,000 cu. ft. daily of Mexican gas. It will pick up the remaining gas from fields along the route of the line.

Texas Eastern says it already has firm bids from its customers for 228,000,000 cu. ft. daily of the additional gas. The remaining 22,000,000 cu. ft. will be held as reserve against future demands.

The proposed line to Mexico will connect at Beaumont with the southern terminus of Texas Eastern's $70,883,000 new 30-in. line to Kosciusko *(The Oil and Gas Journal, October 3, page 98)*. The Kosciusko to Pennsylvania 30-in. line was built in 1952.

**Reasons for expansion . . .** Expansion of the entire system is termed necessary because entry of the Mexican gas would prove too much for the 30-in. line from Kosciusko north. Since 1952 when this line was built, it has carried gas purchased by Texas Eastern from United Gas Pipeline Co. This supply came primarily from the Mississippi River delta area, including production from some offshore fields.

When the new extension of that line from Kosciusko to Beaumont is completed, the entire gas load of the Little Big Inch line (slated for products service) will be shifted to it. With the proposed Mexican gas coming in too, Texas Eastern would be unable to handle the three-way supply merely by adding more compressor capacity on the Kosciusko-Connellsville section.

# Rubber Plant Sold

## Last government works goes to Goodrich-Gulf

WASHINGTON.—The Government's largest and last-remaining synthetic rubber plant, at Institute, W. Va., will be sold to Goodrich-Gulf Chemicals, Inc., for $11,000,000.

The Rubber Disposal Commission announced last week that the company was the highest bidder of six seeking the plant. The Department of Justice has yet to pass on the antitrust aspects of the sale before it is sent to Congress next month for approval.

The Institute plant, with an annual capacity of 122,000 long tons, cost the Government $18,417,854 to build and equip. It had a net book value of $5,616,700 as of August 31, 1954.

The disposal commission started out with a target of $9,500,000 for the plant. It also received offers from the Goodyear Synthetic Rubber Corp., Akron; Imperial Commodities Corp., New York; Edwin W. Pauley, Los Angeles; Union Carbide & Carbon Corp., New York; and United Rubber & Chemical Co., Charleston, W. Va.

The Institute plant was a high-cost producer and was closed down in September 1953.

## Truckers Win Partial Delay

AUSTIN.—A partial restraint has been imposed on a Texas Railroad Commission order reducing motor-freight rates on oil-field pipe.

District Judge Jack Roberts issued the restrainer after hearing a suit attacking the rate order filed by the Oil-field Haulers Association.

He permitted the reduced rates to go into effect December 20 on hauls of pipe from Lone Star, Houston, and other coastal points. But the old rates were kept in effect on all other hauls. Roberts set hearing for December 30 on request by haulers for temporary injunction pending trial of the case on its merits.

The order, even in its present diluted state, will effect a major saving for Texas oil operators. It will place the same rates on pipe whether shipped interstate or intrastate from Texas coastal points. Reduced rates for field hauling will depend on outcome of the suit *(The Oil and Gas Journal, December 19, page 54)*.

# Adena Decision Due

## Field's major operator says unit would double recovery

DENVER.—The Colorado Oil and Gas Conservation Commission will issue an order this week covering proposed unitization of the Adena field in Morgan County.

The proposal was aired at a public hearing last week, then taken under advisement by the state agency. Warwick Downing, chairman, said the order would be issued in time to be effective January 1.

John Wyler of Pure Oil Co., Adena's largest operator, has testified that unitization could up the field's ultimate recovery from 31,750,000 bbl. to 59,538,000 bbl.

Only one major operator, Petroleum, Inc., chose to remain outside the unit. Frederick L. Kurgis and Herman Kaveler, company spokesmen, explained that Petroleum, Inc., operates only four leases that produce just 11.7 per cent of the field's output.

The firm's allocation under unitization, they said, would be only about 8 per cent. And they charged that the structural position of their properties was not given "adequate consideration."

The Adena field, located in the Denver-Julesburg basin, is Colorado's second largest with daily oil production of about 16,000 bbl.

## Interprovincial Jobs Let

WINNIPEG.—Contractors have been named for 119 miles of construction planned in 1956 by Interprovincial Pipe Line Co. to increase capacity of the system from Cromer, Man., to Clearbrook, Minn.

Majestic Contractors, Ltd., will build 67 miles of 24-in. line between Carroll and Somerset, Man., and 2 miles of 26-in. line between U. S. border and a Gretna pumping station. Capacity from Cromer to Gretna will be raised to 241,500 bbl. daily from 183,000 bbl.

Anderson Brothers Corp., Houston, will lay about 50 miles of 26-in. pipe in North Dakota and Minnesota for Lakehead Pipe Line Co., Inc., wholly owned subsidiary of Interprovincial. Capacity from Gretna to Clearbrook will be raised to 212,700 bbl. daily from 156,200 bbl.

## Refinery Start Near

### ● Pontiac's Mississippi plant will be designed to handle heavy crude

HATTIESBURG, Miss. — Construction of Pontiac Eastern Corp.'s 12,000-bbl. refinery near here will start about January 1.

The refinery will be built on a 2,000-acre site purchased by Pontiac Eastern, an affiliate of Pontiac Refining Corp., Corpus Christi. Construction contract has been let to Fluor Corp., Ltd., which also is doing the engineering work.

Completion of the project is scheduled about May 1, 1957. Cost is estimated at about $17,000,000 or $18,000,000.

The refinery, largest in Mississippi, will process Baxterville crude ranging down to about 16° gravity.

Gulf Refining Co. has contracted to supply the plant's crude and to purchase its refined products. Gasoline will be transported through an 8-in. pipeline to be laid between the new refinery and the Plantation Pipe Line system, a distance of about 45 miles. Products will be distributed to markets in the southeastern states.

Principal product will be motor fuel, including both regular and premium grades. The refinery also will turn out small quantities of fuel oil, in addition to coke and sulfur.

Steam-traced lines will be used in some parts of the plant to facilitate handling of the heavy crude.

Units to be installed include a Thermofor catalytic cracker, a fluid coker, alkylation plant, Platformer, Unifining unit, and gas-recovery and sulfur plant.

### Products Line Will Expand

ATLANTA.—Plantation Pipe Line Co. plans a $23,500,000 expansion program next year to step up its deliveries of petroleum products to six southeastern states.

A 327-mile, 18-in. pipeline will be laid from Baton Rouge, La., to Helena, Ala., just south of Birmingham. It will parallel existing 18-in. and 12-in. lines which continue to Bremen, Ga. The new line will increase capacity from Baton Rouge from 245,000 bbl. daily to 304,000 bbl.

When more capacity is needed, the 18-in. line can be extended through Georgia and South Carolina to the system's terminus at Greensboro, N. C. The terminus now is linked with Bremen by dual 14-in. and 10-in. lines.

The company also plans to boost its capacity with two new pumping stations on an 8-in. lateral line between Bremen and Chattanooga, Tenn. Three pumping stations will be reactivated on the 14-in. and 10-in. lines east of Bremen.

### Oregon Well Sets Record

EUGENE, Ore.—Sinclair Oil & Gas Co. has set a drilling-depth record for the Pacific Northwest. It is drilling ahead below 11,058 ft. at its wildcat in Lane County, Oregon.

The test is the 1 Government Mapleton 12 miles north of the town of Swisshome. The depth record highlights considerable drilling activity in the states of Oregon, Washington, and Idaho, where no commercial oil production has yet been found. A small gas well was discovered earlier this year in Payette County, Idaho.

### Gilsonite Contract Let

SALT LAKE CITY.—Contract for building the catalytic reformer and hydrogen plant near Grand Junction, Colo., for the American Gilsonite Co. has been awarded H. K. Ferguson Co. of Cleveland.

The new $10-million plant will produce high-test gasoline and metallurgical coke from Gilsonite, a solid hydrocarbon mineral (*The Oil and Gas Journal, July 11, page 90*). The mineral will be transported in suspension by pipeline from company mines at Bonanza, Utah, to Grand Junction.

## New Plastic Pipe Gets Oil-Field Test

ODESSA, Tex. — A new lightweight plastic pipe—a polyvinyl chloride product of U. S. Steel Corp.—is getting its first rough testing in the oil field.

A pipe-laying crew last week made the first oil-field installation of PVC for the TXL Oil Corp. in the Permian basin 12 miles southwest of Odessa. The workers laid the 2,800-ft. flow line in less than an hour and 45 minutes.

Two-inch, plain-end pipe was used for the job. Fittings were attached by solvent cementing. Workers coupled the 90 lengths at the rate of almost a joint a minute. It took less than 3 hours' working time to string the pipe along the ditch from the truck bed, instruct the crew on laying methods, and complete the job.

The polyvinyl chloride pipe is made by National Tube Division of U. S. Steel Corp. Its boosters do not claim the plastic is a substitute material but a new pipe with many applications.

The pipe comes in two types. One is normal impact type where highest chemical resistance obtainable is required together with high strength and excellent creep properties. The second is high impact designed for excellent chemical resistance and a high degree of toughness even at low temperatures.

# Colombia Prize Won

## Cities Service signs deal to explore 2.2-million-acre El Carare area; it's joint venture with government

CITIES SERVICE CO. will move into Colombia immediately to begin an intensive exploratory program on 2,200,000 acres of El Carare. It is a joint venture with Empresa Colombiana de Petroleos, the government company.

Cities Service has signed a joint development contract with Empresa under which it will meet 75 per cent of the costs of the program in return for 75 per cent of any production, after royalty. Colombia Cities Service Corp. will conduct all operations.

W. Alton Jones, Cities Service chairman, said last week that the El Carare area, in the Magdalena River Valley, has long been regarded as a geological prize. There has been no previous exploration in the region because of a title dispute only recently resolved in favor of the Government. Negotiations between Empresa, the Colombian Government, and Cities Service have been going on for the past 9 months.

The El Carare area lies south of the Magdalena River and is located between the De Mares concession and the Teran Guaguaqui property, owned outright by The Texas Co. since 1929.

Texas Petroleum Corp. has 80 wells capable of producing at least 25,000 bbl. daily in its Velasquez field on this property. The De Mares concession fields have been operated by Empresa since the International Petroleum Co. (Colombia) concession reverted to the government in 1951. The concession contains Colombia's two oldest producing fields, Infantas, discovered in 1915, and La Cira, which dates back to 1926. The two have produced almost 500,000,000 bbl. of oil.

The contract was signed in Bogota by Burl S. Watson, president of Cities Service, and Dr. Francisco Puyana Mendendez, head of Empresa. Dr. Mendendez called the contract "the best of all Christmas presents for our country" and said it is a present "whose value for Colombia cannot be calculated."

The 75-25 split of any production and the provision that the Government will shoulder a part of the production costs are almost identical in their general terms to the deal under which Standard-Vacuum Oil Co. is developing a 10,000-sq. mile area in northeast India. The Indian Government is holding a one-quarter interest and paying its share of the exploratory expenses. India has a similar arrangement with Assam Oil Co., Ltd. (Burmah Oil Co., Ltd.) for a joint company in which the government holds a one-third interest and plans to spend nearly $18 million for oil exploration in the next 5 years.

# Stanvac Posts Prices

## New Far Eastern listings follow lead set by Shell

THE second major firm operating in the Far East has posted prices for its refined products in the world's newest pricing center—the Eastern Hemisphere.

Standard-Vacuum Oil Co.'s Indonesian affiliate, N.V. Standard-Vacuum Petroleum Maatschappij, posted the prices f.o.b. its Sungei Gerong refinery near Palembang, Sumatra. The new figures were effective December 14.

The Stanvac company followed the lead set last July by Shell—a surprise posting of product prices at its Pulu Bukom terminal at Singapore. Stanvac shaded Shell's prices on a number of products. For 100/130 aviation gasoline, Stanvac's posted price of 18.125 cents per U.S. gallon beat Shell's Singapore posting by a quarter-cent. The same is true of the posting on 79 octane motor gasoline.

The Shell group has about 143,000 bbl. daily refining capacity at four refineries in Indonesia. Its Singapore terminal is the general distributing point for the group in that part of the world. Stanvac has the single refinery at Sungei Gerong with a daily output near 71,000 bbl.

Here's the initial Stanvac product price posting, all on a cents-per-U.S.-gallon basis except for medium fuel oil, which is dollars-per-barrel:

| | |
|---|---|
| Aviation gasoline, 100/130 | 18.125 |
| Aviation gasoline, 91/96 | 16.625 |
| Jet fuel, JP 1B | 9.00 |
| Gasoline, 79 octane (research) | 10.00 |
| Illuminating kerosine (25 min. smoke point) | 9.00 |
| Automotive diesel (55 min. diesel index) | 9.00 |
| Industrial diesel oil | 8.50 |
| Medium fuel oil | $2.25 |

# Crude Postings Cut

## ● Creole makes Maracaibo attractive to tankers by 3-cent differential

CREOLE PETROLEUM CORP. has an eye on "the near future" when fully loaded deep-draft tankers can navigate the entrance to Lake Maracaibo. Last week it posted new and lower prices for six types of Venezuelan crudes at ports on the lake.

Effective December 22, the Jersey Standard affiliate shaved 3 cents a barrel from the Amuay or Las Piedras prices for La Rosa, Tia Juana heavy, Lagunillas, and Bachaquero crudes. The 3-cent-lower prices are f.o.b. La Salina. This is Creole's lake terminal which is now undergoing a major expansion program designed to make it handle all the company's Lake Maracaibo production.

The prices were shaved, the company said, to compensate customers for the longer tanker haul through the Gulf of Venezuela, through the Maracaibo bar channel, and into the lake proper. The trip into the lake and back out is about 300 miles farther than a Las Piedras lifting.

The company announced also that Mara crude, 29.5°-29.9° gravity, will be loaded at the lake port of Palmarejo instead of Amuay or Las Piedras, because the lake port can handle only shallow-draft tankers. The posted price of Mara crude has been cut from $2.40 a barrel at Amuay or Las Piedras to $2.28 at Palmarejo.

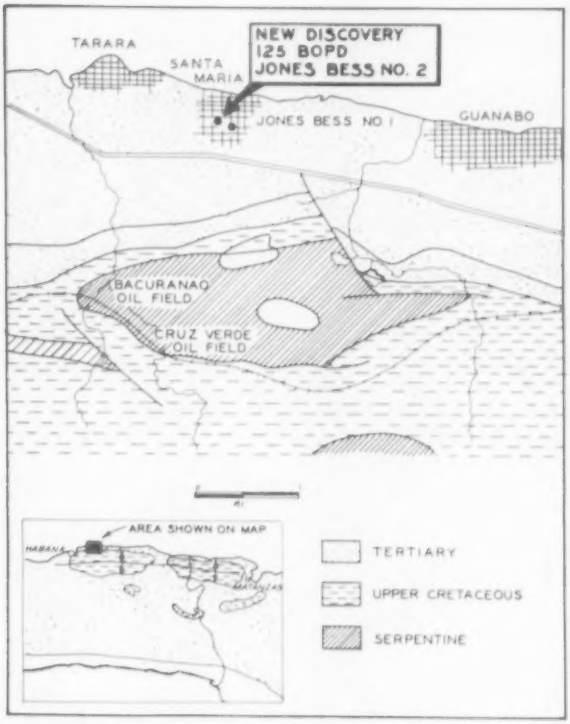
A new 21°-gravity crude, Motatan, was added to Creole's price bulletin at the same time. It will be loaded from San Lorenzo, also a shallow-draft lake port. Its price is $1.90 a barrel.

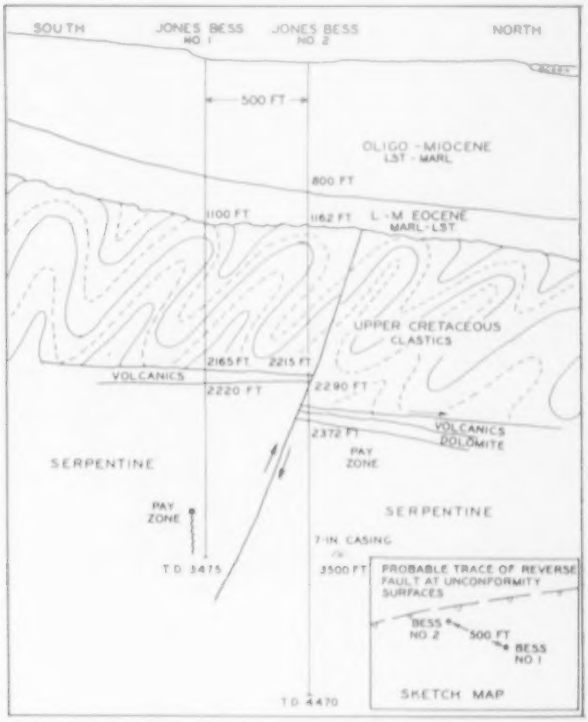
The new price postings for lake ports and anticipation that tankers will travel the lake are possible because of a $7 million construction job which involved building a 2¼-mile-long breakwater about 3,000 ft. east of the lake ship channel and parallel to it. The breakwater, now being completed by the French construction firm, Empresa Campenon Bernard, will keep the channel from silting up.

The new postings:

| Crude— | Gravity | —Price per bbl.— Las Piedras | La Salina |
|---|---|---|---|
| La Rosa | 24.5-24.9 | *$2.25 | $2.22 |
| Tia Juana heavy | 18.5-18.9 | | 2.08 |
| Lagunillas | Flat | 2.05 | 2.02 |
| Bachaquero | 16.5-16.9 | 1.90 | 1.87 |

*Amuay only.




## *Dolomite production found on north coast . . .*

# . . . Jones Strike Perks up Cuban Hopes

**By Harry Wassall**

ON December 2, 1955, the Ted Jones Drilling Co. of Cuba 2 Thomas Bess, about 12 miles east of Havana at Santa Maria del Mar, was completed as a flowing well making over 125 bbl. of oil per day from a dolomite pay zone overlying a massive serpentine body.

This test was spudded on June 8, 1955, set 200 ft. of 10¾-in. surface casing, and reached a total depth of 4,470 ft. Electric and MicroLogs were run to 3,698 ft. and 7-in. casing was set to 3,500 ft.

The rig was then moved off to fulfill a contractual obligation in Jarahueca field. It was moved back again at the end of November and a gamma ray-neutron survey was made on December 1, after which the casing was perforated from 2,508-28 ft. with 80 shaped charges, four to the foot. Tubing was run in the hole and the well started flowing oil when the packer was set. No swabbing was necessary.

The well flowed 16.5°-A.P.I.-gravity oil and no water through a choke varying from 12/64 to ⅜ in. at a steady rate averaging 125 bbl. of oil per day. Flow continues without any change. The flowing pressure averaged about 25 psi. and built up to 245 psi. when shut in for 2 hours.

The oil as it comes out of a 2-in. flow line into the tank has a little froth, which disappears upon settling. Very little gas, other than this froth, is produced. The oil is similar to that found in Jatibonico field, and will probably be marketed without refining as fuel oil for about $2 per barrel at the wellhead. However, a complete analysis may possibly show enough light fractions to warrant refining.

The pay zone was not cored but from cuttings it appears that it is a brown, finely crystalline dolomite, with fracture or vugular porosity. No intergranular porosity can be observed. This dolomite may not be a normal replacement of limestone, because of its close association with serpentine below and volcanic flow rock above. It is missing in 1 Bess, and in the repeated section (2,008-2,290 ft.) in 2 Bess, where in both instances the volcanics overlie the serpentine directly.

## Offset Well Data

This well was drilled about 500 ft. west-northwest of Jones 1 Bess which was completed in March 1955 as a marginal pumper of 25°-A.P.I.-gravity oil from serpentine, through a slotted liner set at 3,124-3,475 ft. The 1 Bess correlates very well with this offset, and they are structurally about level down to 2,290 ft. in 2 Bess. At this point on the basis of electric-log comparison a reverse fault occurs, and correlative lithologies in the underlying fault block are structurally about 300 ft. lower than in 1 Bess. This fault may possibly be the controlling factor of the accumulation in the dolomite as shown on the cross-section sketch.

Although the 1 Bess has not made over a few hundred barrels of oil from serpentine below 3,124 ft., it had very good shows of oil and gas in zones from 859 ft. to total depth. During the drilling two gas blowouts occurred which were attributed to limestones at 1,195-1,205 ft. and 1,450-75 ft. Cores from 2,172-2,280 ft. found abundant shows of heavy oil in volcanics at approximately the same zone which is flowing 16.5°-A.P.I. oil in 2 Bess. Other good shows of heavy oil were found in serpentine at 2,390-2,400 ft., 2,740-50 ft., and then the oil became progressively lighter below 3,100 ft. None of the shows above 3,124 ft. have been tested and there are excellent possibilities that

THE AUTHOR

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the pay zones of heavy oil are present above this depth. In addition, deeper drilling may find accumulations of light oil in the serpentine which are more attractive than the one being exploited in 2 Bess.

Another objective here, as in other areas of Cuba where oil is found in serpentine, is the Cretaceous-Jurassic limestone facies which the writer believes underlies the serpentine and which may contain major accumulations in fractured limestones. In this area these limestones may be from 6,000 to 12,000 ft. deep.

## Geological Location

The Bess wells are located on the northern flank of the Havana-Matanzas anticline. This feature is an anticline in the Tertiary beds only, since the underlying Upper Cretaceous clastics, volcanics, and serpentine were extremely contorted by thrusting and were then truncated and overlapped by the Tertiary. When an east-west-trending uplift occurred, the overlapping beds arched into the 10° dips of the present anticline. The underlying Cretaceous rocks, mapped in the core of the anticline, are by no means conformable. They are isoclinally folded, have dips ranging from 20° to vertical and are cut by many steep-angled, reverse faults.

This newest discovery is just 1 mile north of old Bacuranao field which has produced 25°-A.P.I.-gravity oil from serpentine since 1915. About ½ mile farther south is Cruz Verde field, which began producing in January 1955. Several companies have been drilling in the north coast area, and this latest discovery will undoubtedly increase the activity. It is reported that Ted Jones Drilling Co. plans to test the upper horizons in 1 Bess and drill a twin well to the same pay zone found in 2 Bess. In addition an attempt will be made to clean out Jones 1 Juanita, located about 4 miles east of the Bess wells, and temporarily abandoned at 4,400 ft. in May 1955. This test had good oil shows at 2,100 ft. and below 3,100 ft.

# International BRIEFS

**The first significant discovery in** British Borneo since the end of World War II has apparently been made in a wildcat at Jerudong in Brunei. In a recent short test by British Malayan Petroleum Co., Ltd. (Royal Dutch-Shell), the well produced at the rate of 850 bbl. daily through a ⅜-in. choke from a zone at about 3,500 ft. It has now been shut-in pending more complete testing.

A second rig has been moved to Jerudong by British Malayan from Seria field about 45 miles to the southwest. The company has done exploratory work in the Jerudong area since before World War I but without any previous success. Seria field, the most prolific in the British commonwealth, produces about 100,000 bbl. daily.

**A French company has struck oil** near Port Gentile on the Atlantic Coast of French Equatorial Africa.

The company, Ste. Petroles Afrique Equatoriale Francaise (S.P.A.E.F.), made the discovery at about 3,600 ft. The well reportedly flowed 50 bbl. daily for 10 days before it was shut-in.

**Shell may build a new refinery in** the Philippine Islands.

Shell Co. of P. I., Ltd., told President Magsaysay it is prepared to build the plant subject to satisfactory negotiations with the National Economic Council. Capacity wasn't disclosed. The 13,000-bbl. refinery of Caltex (Philippines), Inc., the only one in the islands, supplies almost one-third of the Philippines' 39,000-bbl. daily consumption.

**British Petroleum Co., Ltd., last week** joined Royal Dutch-Shell Group and Todd Brothers, Ltd., in a partnership venture which will spend a minimum of $2,800,000 in the first major exploratory program in New Zealand since 1944. The oil search will be carried out by a new company, Shell D'Arcy Todd Oil Services, Ltd., in the Taranaki and Rangitikei areas covering the central and western districts of the North Island. Shell and the New Zealand motor distributing firm hold exploration licenses covering about 10,000 sq. miles in the two areas.

**Esso Standard, S.A., Francaise has** applied to the French Government for a permit to build a second 10,000-bbl. daily Model IV catalytic cracking unit at its Port Jerome refinery. The 44,800-bbl. daily refinery put its first cracker on stream in 1953. The second unit is expected to be completed early in 1957. Cost of the new unit is expected to be 400,000,000 francs ($1,160,000).

**Central Explorers, Ltd., Toronto, has** started drilling a well for Israel Continental Oil Co. on a license adjoining the tract on which Israel's first oil producer was drilled by Lapidoth-Israel Oil Prospectors, Ltd. The new well, King David 1, was spudded 2½ miles from Heletz 1, the country's discovery well.

**Gulf Italia Co. (Gulf) will build a** 35-mile crude pipeline from its Ragusa field in southwestern Sicily to the 44,000-bbl. daily refinery operated by the Italian RASIOM company at Augusta. Prince Pignatelli d'Aragona, director of the Gulf subsidiary, said it would be completed by the third quarter of 1956. Size wasn't disclosed.

**Godfrey L. Cabot, Boston, has** organized a new French company, Cabot of France, to produce carbon black at a plant to be completed in about 15 months at Berre Lake. The plant's 40,000-ton annual output is expected to supply all of France's carbon-black requirements which are now 90 per cent imported. Basic oil products for processing into carbon black will be purchased from the Royal Dutch-Shell refinery at Berre Lake.

**A/S Norske Esso, owned 56 per cent** by Standard Oil Co. (N. J.), is negotiating with the Norwegian Government for permission to build a new 30,000-bbl. daily refinery in Norway. The company confirmed Norwegian press reports concerning the refinery talks, but said plans are tentative. Esso now operates the only refinery in Norway, an 1,800-bbl. daily plant at Vallo.

**Sohio - Iran Trading Co., Inc., has** quoted a new price for Iranian 31°-31.9°-gravity crude, $1.67 per barrel f.o.b. Abadan. The figure equals one quoted recently by The Texas Co. for similar grade crude. Both were effective October 1.

**Syria has asked Trans-Arabian Pipeline** Co. to begin talks aimed at increasing the country's revenue from oil carried across its territory. Current revenue from the 30-in. line which crosses a small portion of Syria en route to Lebanon is about $1,200,000 a year. The Syrian Parliament has ratified a new agreement negotiated with Iraq Petroleum Co., Ltd., raising royalties from the company's lines to $20 million a year.

THE JOURNAL PRESENTS ITS . . .

# World-Wide Oil Report

1. In 2 pages of summary tables, and
2. In 56 pages of detailed discussion and tables

The oil-rich deserts of the Middle East soared to new production heights as world output outside of the United States and Canada reached more than 8 million barrels daily. In the Western Hemisphere, Venezuela, with its national economy tied to a spiraling world-wide petroleum demand, hiked production 15.2 per cent to more than 2 million barrels daily.

BY PAUL SWAIN AND RAY G. GIBSON OF THE JOURNAL STAFF

THE United States and Canada were not alone in sharing the upward surge made by petroleum during 1955.

The Middle East chalked up the largest gain for any single area by registering a jump of 19.2 per cent. The countries in this predominately desert land produced 3,229,700 bbl. daily compared to 2,709,800 bbl. in 1954.

The Asia-Pacific islands boosted their production 10 per cent from 340,900 bbl. daily to 376,500 bbl. No accurate comparison can be drawn between the Europe-Africa area this year and with the same area in 1954. This year's table shows a large difference mainly because Austria is shown there instead of under Russia and controlled areas.

Reserves stood 22.5 per cent above last year's figures, with almost all the increase coming in the Middle East. Kuwait alone went up from 30 billion barrels to 40 billion.

Refining showed a more modest gain, 6.2 per cent, than did production. Total capacity outside of the United States and Canada is now 8,119,900 bbl. daily.

| COUNTRY | RESERVES | WELLS | | PRODUCTION | | | REFINING | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Proved bbl. (1,000's) | Total producing 1955 | Drlg. Sept. 1955 | 1,000 bbl. per day avg. for 1955 | Per cent differ. 1954 | Cum. bbl. in 1,000's to 7-1-55 | No. oper. refrs. | Capacity, 1,000 bbl. daily—Crude distillation | Cracking—Catalytic | Cracking—Thermal |
| **Western Hemisphere:** | | | | | | | | | | |
| Argentina | 400,000 | 1,305 | 48 | 83.0 | 4.4 | 579,092 | 16 | 189.1 | 0 | 65.4 |
| Bolivia | 50,000 | 58 | 4 | 7.4 | 64.4 | 10,077 | 4 | 12.3 | 0 | 0 |
| Brazil | 27,000 | 230 | 28 | 5.2 | 100.0 | 5,860 | 9 | 105.8 | 19.7 | 29.5 |
| Canada* | 2,207,614 | 8,200 | 174 | 354.0 | 38.8 | 515,953 | 39 | 608.7 | 211.5 | 172.1 |
| Chile | 25,000 | 34 | 5 | 7.1 | 54.3 | 6,267 | 1 | 20.0 | 0 | 13.4 |
| Colombia | 580,000 | 1,893 | 21 | 109.0 | —0.36 | 712,796 | 3 | 39.5 | 15.1 | 16.5 |
| Cuba | 3,000 | 50 | 6 | 1.1 | 1,000.0 | 3,717 | 3 | 7.7 | 0 | 2.4 |
| Ecuador | 25,000 | 1,437 | 10 | 9.7 | 14.1 | 61,490 | 2 | 6.0 | 0 | 0 |
| Mexico | 1,900,000 | 1,458 | 76 | 250.0 | 7.7 | 2,868,264 | 8 | 408.5 | 0 | 31.0 |
| Netherlands W.I. | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 640.0 | 43.0 | 458.0 |
| Peru | 225,000 | 3,053 | 21 | 47.3 | 0.6 | 484,141 | 3 | 47.5 | 0 | 15.2 |
| Trinidad | 280,000 | 2,701 | 30 | 67.6 | 4.8 | 497,000 | 3 | 115.0 | 15.0 | 35.0 |
| United States* | 29,560,700 | 528,900 | 5,699 | 6,763.0 | 6.6 | 51,356,458 | 305 | 8,643.5 | 3,280.0 | 2,446.7 |
| Uruguay | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 28.0 | 5.0 | 2.0 |
| Venezuela | 12,000,000 | 8,958 | 120 | 2,160.0 | 15.2 | 8,376,357 | 11 | 548.7 | 0 | 91.6 |
| Total | 47,283,314 | 558,277 | 6,242 | 9,864.4 | 9.3 | 65,477,472 | 410 | 11,420.3 | 3,589.3 | 3,378.3 |

*For January 1, 1955.

(Table continued on next page)

| COUNTRY | RESERVES | WELLS | | PRODUCTION | | | REFINING | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Capacity, 1,000 bbl. daily | | |
| | Proved bbl. (1,000's) | Total producing 1955 | Drlg. Sept. 1955 | 1,000 bbl. per day avg. for 1955 | Per cent differ. 1954 | Cum. bbl. in 1,000's to 7-1-55 | No. oper. refrs. | Crude distillation | Cracking: Catalytic | Cracking: Thermal |
| **Europe and Africa:** | | | | | | | | | | |
| Algeria | 5,000 | 45 | 9 | 1.1 | —31.3 | 1,960 | 0 | 0 | 0 | 0 |
| Austria† | 400,000 | ..... | .... | 68.0 | .... | ..... | .... | ..... | ..... | ..... |
| Belgium | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 130.1 | 23.6 | 14.4 |
| Denmark | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.9 | 0 | 0 |
| Egypt | 150,000 | 162 | 7 | 35.0 | —7.4 | 221,558 | 2 | 53.0 | 0 | 6.4 |
| France | 120,000 | 502 | 26 | 18.5 | 71.2 | 32,636 | 13 | 526.3 | 56.3 | 81.9 |
| French Morocco | 14,000 | 90 | 9 | 2.1 | —12.5 | 4,110 | 1 | 2.1 | 0 | 0 |
| West Germany | 495,000 | 2,708 | 106 | 61.5 | 19.4 | 579,092 | 25 | 272.2 | 62.7 | 38.4 |
| Italy (inc. Sicily) | 110,000 | 24 | 40 | 4.4 | 214.2 | 3,700 | 33 | 455.6 | 62.8 | 58.2 |
| Netherlands | 95,000 | 280 | 8 | 19.6 | 10.1 | 40,326 | 2 | 237.0 | 33.0 | 44.7 |
| Norway | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1.8 | 0 | 0 |
| Portugal | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 25.4 | 10.0 | 0 |
| South Africa | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 17.3 | 6.3 | 2.0 |
| Spain | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 85.7 | 0 | 11.7 |
| Sweden | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 35.8 | 0 | 7.4 |
| Switzerland | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4.0 | 0 | 1.0 |
| Turkey‡ | 65,000 | 12 | 5 | 4.5 | 309.0 | 453 | 1 | 6.9 | 3.0 | 0 |
| United Kingdom | 5,000 | 219 | 6 | 1.2 | 0 | 6,557 | 14 | 597.4 | 120.5 | 38.4 |
| Yugoslavia† | 36,000 | ..... | .... | 4.0 | .... | ..... | 3 | 11.5 | 0 | 0 |
| Total | 1,495,000 | 4,042 | 216 | 219.9 | 15.4 | 890.392 | 114 | 2,463.0 | 378.2 | 304.5 |
| **Middle East:** | | | | | | | | | | |
| Aden | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 120.0 | 12.0 | 0 |
| Bahrain | 205,000 | 97 | 1 | 30.1 | 0 | 170,327 | 1 | 186.5 | 21.0 | 35.2 |
| Iran | 27,000,000 | 38 | 1 | 320.0 | 644.0 | 2,610,700 | 3 | 594.4 | 30.0 | 114.0 |
| Iraq | 20,000,000 | 88 | 13 | 690.0 | 10.4 | 1,272,136 | 5 | 46.8 | 0 | 0 |
| Israel | 1,000 | 1 | 4 | 0 | 0 | 0 | 1 | 85.0 | 0 | 43.0 |
| Kuwait | 40,000,000 | 175 | 3 | 1,100.0 | 16.7 | 1,625,222 | 1 | 39.0 | 0 | 0 |
| Lebanon | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 20.5 | 0 | 0 |
| Qatar | 1,500,000 | 31 | 2 | 114.0 | 16.4 | 144,367 | 1 | 0.6 | 0 | 0 |
| Saudi Arabia | 37,000,000 | 147 | 4 | 951.0 | —0.1 | 2,125,489 | 1 | 189.0 | 0 | 24.0 |
| Neutral Zone | 500,000 | 20 | 2 | 24.6 | 31.5 | 9,898 | 0 | 0 | 0 | 0 |
| Total | 126,206,000 | 597 | 30 | 3,229.7 | 19.2 | 7,958,139 | 16 | 1,272.8 | 63.0 | 216.2 |
| **Asia-Pacific:** | | | | | | | | | | |
| Australia | 1,000 | 0 | 11 | 0 | 0 | 0 | 5 | 161.7 | 27.1 | 0 |
| Burma | 45,000 | 74 | 2 | 4.0 | 14.2 | 294,300 | 1 | 3.0 | 0 | 0 |
| Formosa | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 15.0 | 6.5 | 2.1 |
| India | 60,000 | 565 | 11 | 7.2 | 2.8 | 54,000 | 3 | 73.7 | 5.1 | 5.7 |
| Indonesia | 2,300,000 | 1,981 | (¶) | 237.0 | 13.9 | 1,555,908 | 5 | 223.8 | 0 | 59.5 |
| British Borneo | 500,000 | 560 | (¶) | 107.0 | 7.0 | 376,707 | 1 | 47.3 | 0 | 0 |
| Japan | 22,000 | 3,488 | 15 | 6.2 | 8.8 | 96,246 | 16 | 189.5 | 9.2 | 6.1 |
| New Guinea | 50,000 | 49 | 4 | 9.4 | —17.5 | 14,845 | 0 | 0 | 0 | 0 |
| Pakistan | 22,000 | 28 | 5 | 5.7 | 7.5 | 5,094 | 1 | 4.0 | 0 | 0 |
| Philippines | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 13.0 | 5.4 | 0 |
| Total | 3,000,000 | 6,745 | 94 | 376.5 | 10.4 | 2,397,100 | 34 | 731.0 | 53.3 | 73.4 |
| Total free world | 177,984,314 | 569,661 | 6,582 | 13,690.5 | 12.3 | 76,723,103 | 574 | 15,887.1 | 4,083.8 | 3,972.9 |
| Russia and Controlled areas§ | 10,833,000 | ..... | .... | 1,450.0 | 7.6 | ..... | 90 | 1,481.0 | 50.0 | 342.0 |
| Total world | 188,817,314 | ..... | .... | 15,140.5 | 11.8 | ..... | 664 | 17,368.1 | 4,133.8 | 4,314.9 |

*For January 1, 1955. †Austria and Yugoslavia in former reports have been listed as part of U.S.S.R.-dominated area. ‡Turkey previously included in Middle East subtotal. §Includes U.S.S.R. (10,000,000,000), Romania (600,000,000), Hungary (150,000,000), Albania (28,000,000), China (25,000,000), Czechoslovakia (10,000,000), Poland (20,000,000). ¶Indonesia and British Borneo have 46 wells drilling.

# MIDDLE EAST AND EASTERN MEDITERRANEAN

## Bahrain . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 250 | Value | $0.2120 |
| Population | 120,000 | Refining cap., B/D | 186,500 |
| Capital | Manama | Production, B/D | 30,000 |
| Currency | Indian Rupee | Producing fields | 2 |
| | Reserves, bbl. | 205,000,000 | |

A MAJOR part of the expansion program at Bahrain refinery was completed in 1955. Late this year, vacuum distillation capacity of 23,000 bbl. per calendar day was placed in service, adding to 6,900 bbl. daily capacity already in operation. Further additions will be placed on stream in 1957 when a 10,000-bbl.-daily Platformer and a 10,000-bbl.-daily naphtha unit will be ready.

The refinery is one of the largest in the Eastern Hemisphere. It is operated by Bahrain Petroleum Co., Ltd., (Standard Oil Co. of California and The Texas Co.), a member of the Caltex group. Last year, refinery runs averaged 214,000 bbl. daily, nearly all of which was exported. The plant lies on the east coast of Bahrain, a few miles from Awali, a modern, company-built community where Bapco's headquarters are located. Refinery runs are made up of crude from Bahrain's single producing field supplemented by crude from Saudi Arabia. The Saudi Arabia crude is carried by a 34-mile pipeline, part of which lies under the Persian Gulf.

Bahrain consists of a main 250-sq.-mile island in the Persian Gulf off Saudi Arabia plus a few subsidiary islands ruled by an independent shaikh under the protection of the British Government.

Crude output in Bahrain has been stabilized since 1948 at about 30,000 bbl. daily. Of the two pay zones, Cretaceous is at 2,000-2,500 ft. and Jurassic, called Bahrain fourth pay, is about 4,500 ft. High-pressure gas from a lower formation is used for pressure maintenance. A 10-well program in fourth pay "D" zone was under way this year. An overwater drilling program has been delayed because of a boundary question. But some offshore drilling has been done in the undisputed Fasht Adhem area between Bahrain and Qatar with negative results.

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## Iran . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 628,060 | Value | $0.01333 |
| Population | 20,000,000 | Refining cap., B/D | 594,440 |
| Capital | Teheran | Production, B/D | 359,844 |
| Currency | Rial | Producing fields | 8 |
| | Reserves, bbl. | 27,000,000,000 | |

AFTER slightly more than a year of operation under its unique arrangement, the Iranian oil industry is well on the road to recovery.

Before the industry shutdown in 1951, Iran was the fourth-ranking oil producer in the world with an output of around 660,000 bbl. daily. The industry's average daily production for 1955 is expected to be roughly half that

BAHRAIN PRODUCTION

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bahrain Zone | 1932 | 11,700 | 2,200 | 95 | | 8 | 1 | 29,700 | 168,099,884 | 33.0 | Cret. ls. |
| Fourth pay | 1936 | 3,700 | 4,500 | 2 | | 2 | 1 | 300 | 2,227,422 | 36.0 | Jur. ls. |
| Total Bahrain | | | | 97 | | 10 | 2 | 30,000 | 170,327,306 | | |

BAHRAIN REFINING

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Bahrain Petroleum Co., Ltd., Awali, Bahrain (Persian Gulf)—Bahrain | 186,500 | 21,000 | 35,200 | V-29,900, P-1,600, [1]A-114,000 |

(1) Long tons per year.

figure. By the end of next year, Iran should be producing an average of nearly 500,000 bbl. daily and should hit about 637,000 bbl. daily by 1957.

Agha Jari field, 100 miles northeast of Abadan, is now supplying about 75 per cent of Iranian production. In the days before Mossadegh's regime nationalized the industry and expelled the British, the field produced about half the total output. This year a multistage stabilizer was installed in the field raising its production potential by 115,000 bbl. daily to a total of 480,000 bbl. daily.

The remainder of Iran's production is coming from four other fields. One, Masjid-i-Sulaiman, has been in production for 48 years. Gach Saran, Iran's shallow field and perhaps one of the largest oil fields in the world, is not even being produced. Gach Saran's crude is not as high quality as other Iranian fields and its geographical location is not as convenient to ports and the Adaban refinery as others, but the tremendous reserve it holds would make Iran a power to be reckoned with in world oil if the country never had another discovery.

The Iranian industry will undertake a relatively small drilling program to include both exploration and development work for next year, but the final plans have not yet been made. The industry's production and exploration company is now negotiating with a drilling-contracting firm in the United States to do the work.

### One-Time Eminence Probably Lost

Because the industry moved as quickly as possible to plug the refining gap left in the Eastern Hemisphere by the shutdown of Abadan in 1951, it is doubtful that Iran will ever regain the eminence she once held as a refining country. The refinery shutdown left a 500,000-bbl.-daily hole in the world's refining capacity at a time when the very size of the plant made it dominant. Since that time other capacity has been built to replace Abadan.

Refinery runs at Abadan in September of this year averaged 158,000 bbl. daily after an entire year's work of renovating units and putting them back on stream. Runs are expected to average about two-thirds of the mammoth refinery's capacity by 1957. The 25,000-bbl.-daily cat cracker, which ran less than 3 months after it went on stream in April 1951, went back on stream last month. Alkylation units are being put back on stream as they are overhauled and the refinery is now ready to export some aviation gasoline.

The settlement of the nationalization issue late last year was one of the most important events in Middle East oil industry history. Under the agreement, British Petroleum Co., Ltd., (formerly Anglo-Iranian Oil Co.), which had held the concession since 1901, took a 40 per cent interest in the new operation. The company agreed to take $600,000,000 for the remaining 60 per cent which was distributed to other partners. British Petroleum will be reimbursed for the 60 per cent by a levy of 10 cents a barrel on future production. Other companies which acquired an interest included Royal Dutch-Shell, 14 per cent, and Cie. Francaise des Petroles, 6 per cent. The remaining 40 per cent was originally held by five American firms: Standard Oil Co. (N. J.); Socony Mobil Oil Co., Inc.; Gulf Oil Corp.; The Texas Co.; and Standard Oil Co. of California.

This year, participation by American oil companies was broadened. A 5 per cent share in the Iranian operation was transferred to a group of nine more United States companies. This was due to terms of the settlement with the Iranian Government, under which each of the five American participants were to transfer 1 per cent of their separate 8 per cent shares to a new firm composed of other qualified U. S. companies. Companies holding a part of this 5 per cent are: Atlantic Refining Co., Hancock Oil Co., Pacific Western Oil Corp., Richfield Oil Corp., San Jacinto Petroleum Co., Signal Oil & Gas Co., American Independent Oil Co., Standard Oil Co. (Ohio), and Tide Water Associated Oil Co.

Companies interested in taking part of the 5 per cent applied to the State Department early this year. Proposals were checked by Price Waterhouse & Co., which approved applicants for various amounts of the 5 per cent. Twelve companies were certified. Besides the participants there were Cities Service Co., Sinclair Oil Corp., and

**IRAN PRODUCTION**

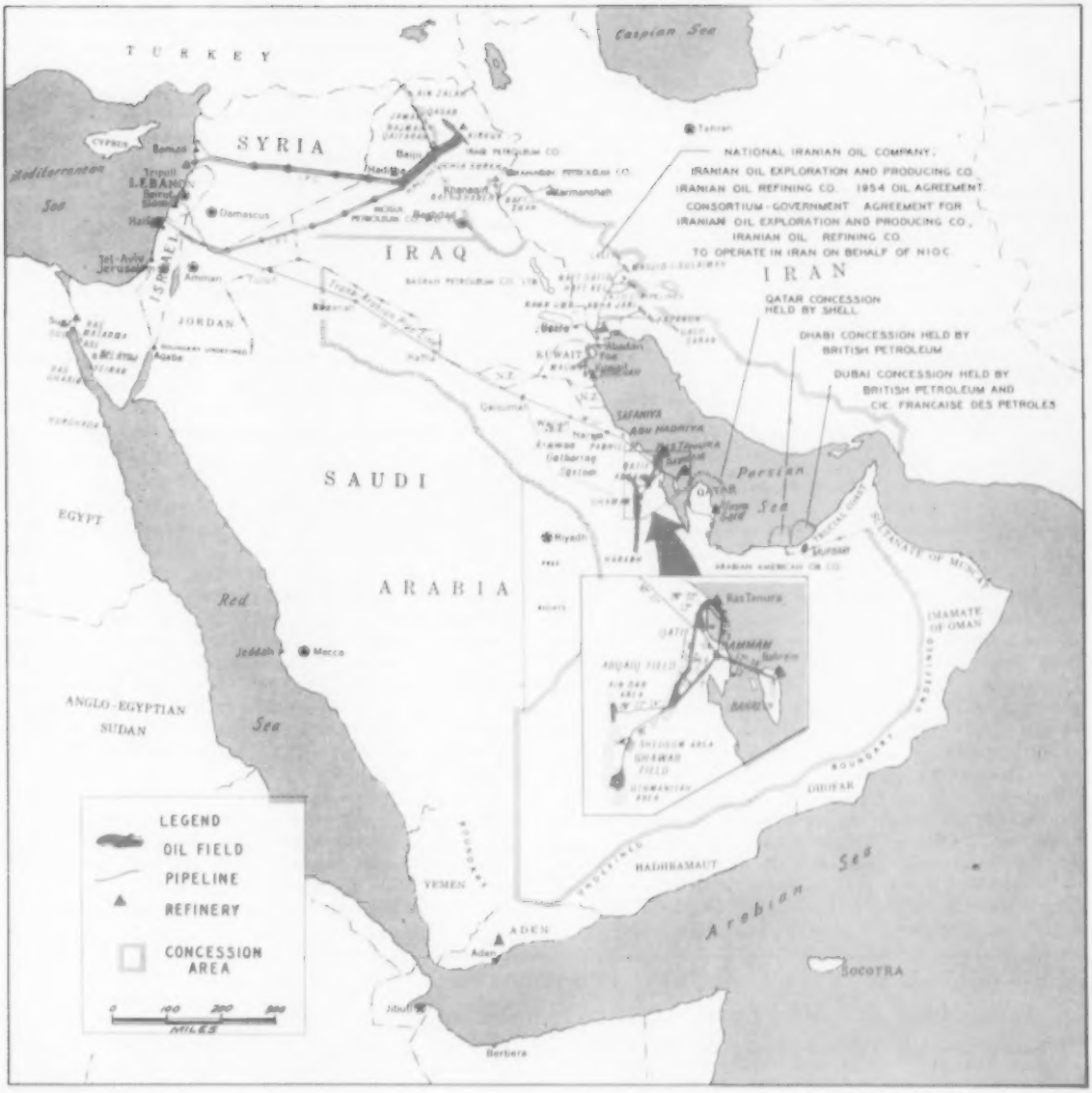
| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aghi Jari | 1936 | 61 | 4,900-9,800 | 13 | | 5 | | 269,000 | 37,428,000 | 35.0 | Olig., Mio. ls. |
| Gach Saran | 1928 | 30 | 2,800-6,150 | 1 | | 3 | | 129 | 26,000 | 31.0 | Olig., Mio. ls. |
| Haft Kel | 1928 | 30 | 1,900-4,000 | 6 | | 15 | | 34,815 | 7,180,000 | 38.0 | Olig., Mio. ls. |
| Lali | 1938 | 57 | 4,000-9,000 | 1 | | 3 | | 5,600 | 953,400 | 37.0 | Olig., Mio. ls. |
| Masjid-i-Sulaiman | 1908 | 45 | 640-3,600 | 15 | | | | 34,000 | 6,211,000 | 38.0 | Olig., Mio. ls. |
| Naft Safid | 1935 | 30 | 3,000-6,000 | | | 7 | | 12,000 | 340,000 | 35.0 | Olig., Mio. ls. |
| Pazanun (gas field) | 1937 | | | | | | | | | | |
| Naft-i-Shah[1] | 1923 | | 1,980 | 2 | | 7 | | 12,000 | 346,600 | 35.0 | Olig., Mio. ls. |
| Total Iran | | | | 38 | | 33 | | 359,844 | [2]2,610,700,000 | | |

(1) Government operated field. (2) Total accumulative since initial discovery in 1908.

**IRAN REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Iraanse Aardolie Raffinage Maatschappij N. V. (Iranian Oil Refining Co.)—Abadan | [1]585,000 | 30,000 | 114,000 | Alky-11,000, L-470, A-5,000 |
| National Iranian Oil Co.: | | | | |
| Naft-i-Shah refinery | 5,140 | | | |
| Kermanshah refinery | 4,300 | | | |
| Total Iran | 594,440 | 30,000 | 114,000 | |

(1) Capacity of refinery before nationalization. Refinery operating at about 183,000 bbl. daily in October. Cat cracker went on stream in November, running 20,000 bbl. daily.




## MIDDLE EAST

**. . . an area with two-thirds of the world's oil reserves expands rapidly in world markets.**

Anderson-Prichard Oil Corp. Before the transfer of the 5 per cent was made final, Anderson-Prichard transferred its interest to Aminoil, and Sinclair and Cities Service to Richfield. In the final agreement, the 5 per cent was divided equally among the 12 certified companies. Because of the transfers, Richmond wound up with 25 per cent, Aminoil 16⅔ per cent, and the other seven companies, 8⅓ per cent. Iricon Agency, Ltd., was formed to hold the 5 per cent share on behalf of the companies.

The consortium agreement carries most of the advantages of a standard concession, but title to facilities is held by the government company, National Iranian Oil Co. Two operating companies handle consortium operations: Iranian Oil Exploration & Producing Co., and Iranian Oil Refining Co. The government appoints two of seven members to the board of directors of each company. The consortium partners, including those with an interest in Iricon, have each formed a trading company to buy and export individual shares of production.

This year, N.I.O.C. signed construction contracts for a 573-mile, 10-in. products pipeline from Ahwaz to Teheran. The line will relieve the hard-pressed railroad which transports products most of the way from Abadan refinery to the capital. To cost about $32,000,000, the line will have a capacity of 40,000 bbl. daily. It will cross the Zedran Mountains at more than 10,000 ft. above sea level, believed to be the highest pipeline elevation in the Eastern Hemisphere. Costain-John Brown, Ltd., London, is building the 337-mile south section, which will have four pumping stations. Williams Brothers, Tulsa, is consultant for this part of the line. The firm's equipment, which has been used to build the military products line in Alaska, was shipped to Iran late this year. The northern section of the Iranian line will be built by Entrepose, Paris.

N.I.O.C. acquired the small Kermanshah refinery and nearby Naft-i-shah field in northwestern Iran, under a separate agreement with British Petroleum. Output from

the field and refinery is used locally. The field is a producing area which lies across the Iran-Iraq border. Production in Iran is about 4,000 bbl. daily. The Iraq side of the field is called Naft Khaneh.

The government company has the right to sell on the world market the 12½ per cent royalty on consortium production. This year, about 4,500,000 bbl. was sold to Idemitsu, a Japanese firm. N.I.O.C. also has contracted to supply crude to the Italian firm of Supor. The sales are more significant as an effort by Iran to build up its international oil trade, than from the actual amounts of crude moved.

## Iraq . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 116,600 | Value | $2.81 |
| Population | 5,100,000 | Refining cap., B/D | 46,830 |
| Capital | Baghdad | Production, B/D | 700,226 |
| Currency | Dinar | Producing fields | 8 |
| | Reserves, bbl. | 20,000,000,000 | |

ALL phases of Iraq's oil industry expanded this year. Iraq Petroleum Co., Ltd.'s crude production rose to an all-time high, averaging about 665,000 bbl. daily from January through August. Shipments through the company's pipeline system to eastern Mediterranean ports were at a record level. Kirkuk field in north-central Iraq, mainstay of the country's crude output, had an output of around 500,000 bbl. daily the first 8 months. The field, a narrow anticline more than 60 miles long with three subsurface domes, produced a record volume of 534,300 bbl. daily in August.

Development work was carried on this year in two other fields in the Kirkuk region. Jambur is located about 25 miles southeast of Kirkuk. The field has sweet crude of around 40° A.P.I. gravity, valuable oil in the Middle East where most production ranges from 32° to 36° gravity. A pipeline from Jambur to Kirkuk was planned and two additional wells were being drilled in a program to bring the field into commercial production late this year. Bai Hassan field, discovered in 1953, lies about 20 miles northwest of Kirkuk. Crude from the field is of about 33° gravity.

To handle an anticipated throughput increase in the pipeline system which carries Kirkuk production to the Mediterranean, I.P.C. plans to build a 75-mile, 24-in. line from Homs, Syria, to Tripoli, Lebanon. The new line will carry up to 180,000 bbl. daily made available by the addition of two more pumping stations to the existing 30-in. trunk. Lines now in operation consist of twin 12-in. and 16-in. lines and an older 30-32-in line. The larger line terminates at Banias, Syria. One set of 12 and 16-in. lines carry crude to Tripoli. The other set and an unfinished 16-in. line lead to the Haifa refinery in Israel. This line has not operated since the Arab-Israel war in 1948.

### Subsidiary Makes Production Guarantee

Production in southeastern Iraq is handled by Basrah Petroleum Co., an I.P.C. subsidiary which has guaranteed to produce 160,000 bbl. daily by the end of 1955. This production level already has been exceeded on a monthly basis. In April, output averaged 162,200 bbl. daily. Production from the main field in this area, Zubair, was backed up this year by output from the newly developed Rumaila field. Field facilities which were built to bring Rumaila into commercial production included a gathering system, a separator station capable of handling up to around 80,000 bbl. daily, and a 20-mile, 14½-in. pipeline northeast to Zubair. Rumaila crude can be stored in tankage in the field, or it can move directly to the tanker terminal on the Ahatt-el-Arab River at Fao on Persian Gulf.

Another I.P.C. subsidiary, Mosul Petroleum Co., Ltd., operates two small fields northwest of Kirkuk. They are Ain Zalah and Butmah. This crude is moved through a 12-in., 135-mile line to the main I.P.C. system, connecting at station K-2 on the Tigris River.

I.P.C. itself and through subsidiaries holds a concession

### IRAQ PRODUCTION

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ain Zalah | 1939 | | 6,150 | 5 | | 4 | | 21,000 | 23,340,000 | 35.2 | Cret. ls. |
| Bai Hassan | 1953 | | 4,200 | | | | 1 | | | | Olig., Mio. ls. |
| Butmah | 1952 | | 3,750 | | 3 | | | 5,000 | 2,521,000 | 34.3 | Cret. ls. |
| Jambur | 1954 | | 5,800 | | | | 2 | | | | Olig., Mio. ls. |
| Kirkuk | 1927 | | 2,750 | 44 | | 1 | | 519,000 | 1,092,055,000 | 35.2 | Mio., Eoc. ls. |
| Naft Khaneh | 1923 | | 3,000 | 2 | | | | 12,226 | 52,886,000 | 41.7 | Olig., Mio. ls. |
| Rumaila | 1953 | | 11,000 | 6 | | 1 | 3 | 58,000 | 9,485,000 | 33.0 | Cret. ss. |
| Zubair | 1949 | | 11,000 | 28 | | 10 | | 85,000 | 91,849,000 | 32.1 | Cret. ss. |
| Total Iraq | | | | 85 | 3 | 16 | 6 | 700,226 | 1,272,136,000 | | |

### IRAQ REFINING

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Government Oil Refineries Administration, P.O. Box 278, Baghdad— Baghdad | 24,000 | | 21,080 | [1]L-500, [1]A-19,000 |
| Iraq Petroleum Co., Ltd., 214 Oxford Street, Oxford Circus, London W. 1, England: | | | | |
| K. 3 (Haditha) | 6,450 | | | |
| Kirkuk | [2]2,880 | | | |
| Khanaquin Oil Co., Ltd.: | | | | |
| Khanaquin | 10,250 | | | |
| Muftieh Depot, Basrah | 3,250 | | | [2]V-300, [3]A-100 |
| Total Iraq | 46,830 | | | |

(1) Planned. (2) Plant also has 565,000-bbl.-daily crude-oil stabilization unit. (3) Planned.

over the greater part of Iraq: I.P.C. operating in the northeast, Mosul in the west, and Basrah the south. The history of I.P.C., the old Turkish Petroleum Co., dates back to before World War I. The four principal owners of the company, each with 23¾ per cent interest are: British Petroleum Co., Ltd., through D'Arcy Exploration Co., Ltd.; Royal Dutch-Shell, through Anglo-Saxon Petroleum Co., Ltd.; a French group, Cie. Francaise des Petroles (C.F.P.); and two American companies, Standard Oil Co. (N.J.) and Socony Mobil Oil Co., Inc., through Near East Development Corp. Calouste Sarkis Gulbenkian, who was instrumental in setting up the original company in the days of the Ottoman Empire and who was an influence in the international oil business for six decades, died in July in Lisbon, Portugal. He was 86 years old. At the time of his death, he held the remaining 5 per cent ownership in I.P.C. through Participations & Explorations Corp.

The area in Iraq not under concession to I.P.C. is on the eastern border. British Petroleum holds a concession here on a territory originally a part of its Iranian concession before a border adjustment. A single field straddles the border. It is called Naft Khaneh in Iraq and Naft-i-shah in Iran. During the first half of 1955, Naft Khaneh produced 12,200 bbl. daily of 41.5°-gravity crude. A development well, drilled to 7,800 ft. this year, was a dry hole.

This summer, a new 25,000-bbl.-daily government-owned refinery went on stream at Dora, near Baghdad. It operates on royalty crude received from I.P.C. by a 12-in. pipeline from producing fields. Facilities include a combined processing unit that integrates crude distillation, cracking, reforming, and vacuum flashing. M. W. Kellogg Co. built the refinery. A contract has been let to Foster Wheeler, Ltd., for the construction of a $9,400,000 lubrication-oil plant at the refinery. It is designed to produce 25,000 tons of lubricants a year.

The Iraq Government's revenue from oil this year is expected to reach about $202,000,000, up more than $11,000,000 from last year. The 50-50 agreement of 1952 was amended this year to give the government a larger profit on crude. In March, the so-called offtaker discount was eliminated under which owners of the concession holding company were allowed discounted price below posted prices. In place of the offtaker discount, a substitute incentive 2 per cent cut off the posted price was put into effect. The government said the new setup would raise its profit by 12.9 cents a barrel. The agreement was made retroactive through 1954. About 70 per cent of the government income is budgeted for development of the country. Half of these allocations have been earmarked for irrigation, drainage, and dam projects to build up the agricultural side of the economy.

# Israel . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 7,800 | Value | $1.00 |
| Population | 1,500,000 | Refining cap., B/D | 85,000 |
| Capital | Jerusalem | Production, B/D | |
| Currency | Pound | Producing fields | 1 |
| | Reserves, bbl. | 1,000,000 | |

ISRAEL is the world's newest oil-producing country, but as 1955 ends it is still too early to determine the new state's true position in the petroleum world.

Israel's first oil well, Heletz 1, was drilled by a partnership venture of Lapidoth Israel Oil Co., Ltd., and Israel Oil Prospectors, Ltd. The well first encountered a 7-ft. productive zone at the top of the lower Cretaceous at 4,906 ft. on September 23. When the 30°-gravity oil blew out of the hole, the country went slightly mad. Government officials and private citizens streamed to the well site by the hundreds to get samples of the oil.

Initial tests indicated the zone would produce about 300 bbl. daily, but the well was deepened. A second and much thicker formation was encountered a little more than 40 ft. below the first. Unofficial estimates placed the well's productive potential in the 350 to 400 bbl. daily range.

Two stepouts, each less than a quarter mile from Heletz 1, are being drilled by Lapidoth-Israel and one is below 1,000 ft. Both will hunt deeper production than that found in the discovery.

Israel's discovery was made by deepening an old hole drilled at Huleiqat in 1948 before the birth of the state of Israel when the country was Palestine and a British mandate. Iraq Petroleum Co. had less than 1,500 ft. to go to the pay when Arab-Israeli hostilities broke out and the well was abandoned at 3,464 ft. The site is less than 6 miles from the Egyptian-held Gaza Strip, one of the sore spots involved in armed clashes between Egypt's forces and Israeli troops.

### No Prediction of Field Size Made

Officials of the two companies have made no predictions of the size of the field they have, but geological observers in Israel believe Heletz may support from 30 to 50 more wells.

Israel depends solely on petroleum for its energy needs. It has no hydroelectric power and no coal. The state spends about $40,000,000 a year on oil imports.

Operators of the Heletz well are laying a pipeline from the well 5 miles to Ashkelon and the railroad so the crude can be hauled to the Haifa refinery, 100 miles to the north, by rail.

**ISRAEL PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells—Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.—July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heletz No. 1[1] | 1955 | | 4,906 | 1 | | | 3 | ?300 | | 28-30 | L. Cret. ss. |

(1) Name of well, field not yet named. (2) Estimated.

**ISRAEL REFINING**

| Company and address—Refinery location— | Barrels per stream day—Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Consolidated Refineries, Ltd., Brittanic House, Finsbury Circus, London, E.C. 2, England—Haifa | [1]85,000 | | 43,000 | A-1,000 |

(1) Plant operating at only one-quarter of capacity.

The 87,000-bbl. daily refinery of Consolidated Refineries, Ltd., (Shell-British Petroleum) is now operated at about 20 per cent of capacity on imported crude. The plant refines just enough to meet Israel's product needs. The refinery once operated on Iraq crude transported by Iraq Petroleum pipeline system across Syria from Iraq's fields. The Haifa line has not been used, however, since the outbreak of Arab-Israeli fighting in 1948.

The discovery sparked a new surge of drilling in southwestern Israel. There are 13 licenses in the country's petroleum District 2 and the Israeli oil law provides other operators holding licenses must start drilling within 6 months after a discovery in any district.

All exploration activity has been stepped up sharply since Heletz and it will continue to increase in 1956. Four new rotary rigs have been ordered in the United States for delivery to two companies in Israel early in 1956. Two of the new rigs will go to Israel Water Works, Ltd., and two to Matsada Co., a joint-venture drilling company organized by Lapidoth and Israel Oil Prospectors. Each company will get one Ideco H-525 torque-convertor rig with a 133-ft. full-view mast and rated to 7,000 ft. and one Ideco H-750 rig with a 143-ft. mast, rated to 9,000 ft. Lapidoth owns three of the five rigs now operating in Israel.

### German Equipment Being Tested

In addition to the new rigs from the United States, German drilling equipment is being tested in Israel. If it proves effective, the country may buy equipment from Germany without depleting foreign currency reserves. She could do this under the terms of the Israel-West German reparations agreement designed to repay Israeli citizens for property seized by Germany.

Exploration licenses granted by Israel under the petroleum law passed 3 years ago cover 2½ million acres, or about half the country's total land area. Eight companies hold the exploration licenses, and there are actually four active groups because they have combined efforts in several areas.

In addition to Lapidoth and Israel Prospectors, companies holding licenses include Israel Mediterranean Petroleum Corp. and Pan-Israel Oil Co., Inc., both representing the W. F. Buckley interests, Israel Continental Oil Co., Ltd., a Canadian firm; Israel-American Oil Corp., organized by Husky Oil Corp., Cody, Wyo., and Bear Stearns & Co., New York investment company; Nadel & Gussman, Tulsa, jointly with Palestine Economic Corp., New York, and D. C. Bintliff, Houston.

# Kuwait . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **1,950** | **Currency** | **Indian Rupee** |
| **Population** | **100,000** | **Refining Cap., B/D** | **30,000** |
| **Capital** | **Kuwait** | **Production, B/D** | **1,108,357** |
| **Value** | **$0.212** | **Producing fields** | **3** |
| | **Reserves, bbl.** | **40,000,000,000** | |

KUWAIT, a small shaikhdom at the head of the Persian Gulf, led the Middle East in crude production this year. Output during the first half of 1955 averaged better than 1,100,000 bbl. daily, up nearly 23 per cent over the same period last year.

The shaikhdom exported its first barrel of crude 9 years ago. Since then, it has become the world's fourth ranking producer. The comparatively little field development needed to establish Kuwait behind the United States, Venezuela, and Russia, indicates the immense capacity of the area.

At the end of June 1955, a total of 181 wells had been completed. Of these, 137 were in Burgan field and 44 in the Magwa-Ahmadi area. The number of producing wells was 176, an average of around 6,200 bbl. daily per well. One well awaited completion of flow line and four were observation wells. To date, only two dry holes have been drilled in Kuwait. One was at Bahra in 1936-37, the other at Umm Gudair in 1954.

All production is controlled by Kuwait Oil Co. Ltd., which holds concessions over the entire shaikhdom. The company is owned jointly by subsidiaries of Gulf Oil Corp. and British Petroleum Co., Ltd. (formerly Anglo-Iranian). The concession was granted in 1934 after Gulf met the shaikh's conditions of forming a British corporation and associating with Anglo-Iranian. These terms were an outgrowth of the shaikh's gratitude to Great Britain for its protection during World War I. The initial discovery was made 4 years after the concession was granted. Nine wells had been drilled when operations were suspended because of World War II. The wells were reopened in 1945 and shipments began a year later. When Iranian production was curtailed in 1951, Burgan field's capacity for expansion helped avoid a gap in world supplies.

### Two-Rig Program Results in 11 Wells

During the first half of this year, 11 wells were completed in a two-rig development-drilling program. Eight were in Magwa-Ahmadi area and three were in Burgan field. One Burgan well was a stepout on the northeastern

**KUWAIT PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Burgan | 1938 | | 3,500-4,800 | 133 | | [1]4 | | | | 31.9 | Cret. ss. |
| Magwa-Ahmadi | 1952 | | 3,500-4,800 | 42 | | [2]2 | 2 | | | 31.9 | Cret. ss. |
| Total Kuwait | | | | 175 | | 6 | 2 | [3]1,108,357 | 1,625,222,537 | | |

(1) Four observation wells. (2) One observation well and one awaiting flow line. (3) Daily average for first 6 months of 1955.

**KUWAIT REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Kuwait Oil Co., Ltd., 1 Great Cumberland Place, London, W. 1, England—Mina-al-Ahmadi | 30,000 | | | A-210 |

flank and two were infill wells. The Magwa-Ahmadi wells were drilled on the regular 600-acre spacing pattern. This drilling confirmed that the Magwa and Ahmadi Ridge areas are one producing area. An exploration well drilled at Raudhatain in north Kuwait reached a final depth of 10,301 ft. The well's objective was to determine commercial possibilities of the Zubair series. Tests have been started. Geophysical survey work in north Kuwait continued throughout the year.

Kuwait crude comes from three sand members of Cretaceous age, differing from most other large Middle East fields which produce from limestone formations. Middle Cretaceous at the Burgan field crest is about 1,000 ft. The most productive zone has a crest thickness of about 300 ft. The lower zone has a thickness of more than 500 ft. above water contact.

Crude-oil storage at Ahmadi tank farm was increased this year by the addition of four 210,000-bbl. tanks. These raised the total operating capacity to about 5,000,000 bbl. (to top gage). A fifth tank of the same size was commissioned, but was temporarily storing fresh water at mid-year. The new tankage together with a 3-mile loop addition to one of the three 20-in. transit lines enabled the 1,000,000 bbl. daily-plus production to be maintained.

### Housing Program Continued

The housing construction program continued at a steady rate. By the end of June, 1,718 permanent houses had been built for all employe grades. A large public-security building has been completed at Ahmadi, which houses the government administration and police force.

An average of 231 tankers per month were handled at the port of Mina al-Ahmadi the first part of the year. The United Kingdom was the destination for most of the crude. Last year, U.K. took about 43 per cent of Kuwait exports. United States and France each took about 12 per cent; Netherlands, 11 per cent; and Italy 7 per cent. Other customers included Argentina, Belgium, Germany, Sweden, Yugoslavia, Aden, Formosa, Japan, Canary Islands, and Australia.

A revised income-tax decree in Kuwait issued late this year enabled British Petroleum to take credit for Kuwait taxes when paying taxes in the United Kingdom. This tax relief, sought for many years allowed B.P. to increase its consolidated 1954 earnings by $28,000,000. In other governmental matters, the ruling shaikh, Abdullah Al-Sabah, turned over his personal wealth to a newly formed state treasury. Thus, oil royalties and other revenues become state income.

## Neutral Zone . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **2,000** | **Production, B/D** | **26,000** |
| **Reserves, bbl.** | **500,000,000** | **Producing fields** | **2** |

THE Middle East's newest producing area, the Kuwait-Saudi Arabia Neutral Zone, increased its output by about one-third in 1955, its second year of commercial operation. Since shipments began in January 1954, development drilling and construction of field facilities have permitted a relatively steady growth in output.

By the end of 1955, cumulative production is expected to total around 15,000,000 bbl. The 1955 average is nearly 25,000 bbl. daily, against 16,500 bbl. daily last year. In the upward curve of output, 26,000 bbl. daily was reached in August, and 30,000 bbl. daily in mid-September.

The Neutral Zone is a small, wedge-shaped desert area on the Persian Gulf between Kuwait and Saudi Arabia. The territory is owned jointly by the two countries. Pacific Western Oil Corp. obtained a concession in 1949 for the undivided half interest belonging to Saudi Arabia. The concession covering Kuwait's undivided half interest was granted to American Independent Oil Co. (Aminoil) in 1948.

Production comes from Burgan sands in Wafra field. The initial discovery was made in 1953 after an exploration outlay of $30,000,000 by Aminoil, serving as operator for the two companies. Late last year, a deep test, Wafra A-1, was drilled to test the Arab Zone and deeper formations which are productive in Saudi Arabia. No

**NEUTRAL ZONE PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wafra (Burghan sand) | 1953 | 8,650 | 3,550 | 20 | | 1 | 1 | 26,000 | 9,898,345 | 24.0 | M. Cret. sd. |
| Wafra (Ratawi zone) | 1954 | | 6,445 | 0 | | 1 | | | | 25.0 | L. Cret. sd. |
| Total Neutral Zone | | | | 20 | | 2 | 1 | 26,000 | 9,898,345 | | |

**QATAR PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dukhan | 1940 | | 6,450 | 31 | | 8 | 1 | 116,000 | 144,367,000 | 39.0 | Jur. ls. |

**QATAR REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Qatar Petroleum Co., Ltd., Umm Said—Umm Said | 600 | | | |

**LEBANON REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Iraq Petroleum Co., Ltd., P.O. Box 150, Tripoli—Tripoli | 11,550 | | | |
| Mediterranean Refining Co., Beirut: Sidon | 9,000 | | | R-1,120 |
| Total Lebanon | 20,550 | | | |

commercial reserves were proved in these formations. But a discovery was made in the equivalent of the Ratawi zones of Iraq. This was a limestone reservoir found at a depth of 6,445 ft. The Ratawi zones were not at first evaluated. However, two 1-mile stepout wells were slated for drilling later this year to test the new pay. The stepout wells were part of a nine-well development drilling program planned for the last half of 1955. Late this year a wildcat well was testing several zones which have found prolific production in other Middle East areas.

Each company has its own terminal facilities. Aminoil transports its share of crude through a 34-mile, 8 and 10-in. pipeline running northeast to Mena Abdulla, in Kuwait, named in honor of the present ruler. Tankers are loaded from a 16-in. submarine line extending about 9,500 ft. into the Persian Gulf. Pacific Western crude is carried eastward to Mena Saud terminal, in the Neutral Zone, named in honor of the king of Saudi Arabia. Pacific Western's system has a 10-in. pipeline and a 20-in. submarine line. The lines and other terminal facilities were placed in service at the beginning of this year. Neutral Zone crude has been exported to at least four countries this year: the United States, Japan, Italy, and France.

## Qatar . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **5,000** | **Value** | **$0.212** |
| **Population, est.** | **25,000** | **Refining Cap., B/D** | **600** |
| **Capital** | **Dohah** | **Production, B/D** | **116,000** |
| **Currency** | **Indian Rupee** | **Producing fields** | **1** |
| | **Reserves, bbl.** | **1,500,000,000** | |

OFFSHORE drilling was started this year off the east coast of Qatar. Royal Dutch-Shell, which holds a marine concession on areas outside the shaikhdom's territorial waters, is using a 1,900-ton movable platform for its wildcatting. The well, 1 Matbakh, was located after 18 months of geophysical work.

Shell obtained its concession in 1952 on an area relinquished by Superior Oil Co. The entry of Shell into the Persian Gulf was made possible by the dissolution of the old Red Line agreement under which partners in Iraq Petroleum Co., Ltd., were bound to joint operations in most of the Middle East.

The concession over the mainland and territorial waters is held by Qatar Petroleum Co., Ltd., a part of the I.P.C. group. Production in Qatar, a 100-by-80-mile peninsula extending into the Persian Gulf from Saudi Arabia, comes from a single field, Dukhan, discovered in 1940. This year, output is at an all-time high level, averaging around 110,000 bbl. daily. A 600-bbl.-daily topping plant was opened last spring at Umm Said. The plant meets local requirements at the terminal for the 65-mile, 14-in. pipeline which carries Dukhan crude to the east coast.

## Saudi Arabia . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **870,000** | **Value** | **$0.2725** |
| **Population** | **6,500,000** | **Refining cap., B/D** | **189,000** |
| **Capital** | **Mecca and Riadh** | **Production, B/D** | **944,312** |
| **Currency** | **Riyal** | **Producing fields** | **7** |
| | **Reserves, bbl.** | **37,000,000,000** | |

SAUDI ARABIA will give up its title this year as the Middle East's biggest producer to Kuwait in another round of the see-saw struggle between the two prolific producing countries.

Saudi Arabia took the top rank away from Kuwait in 1954. This year Kuwait takes it back.

The daily average production from Saudi Arabian fields for the first 10 months of 1955 was 951,093 bbl. Kuwait's fields produced an average of 1,099,300 bbl. daily over the same period of time.

Saudi Arabia's oil-industry problems during 1955 continued to be political rather than operational, but the only wholly American operation in the Middle East can point to some records for the year.

Early in the year, Saudi Arabia produced its second

**SAUDI ARABIA PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Abqaiq | 1941 | 88,600 | 6,800 | 46 | | [1]18 | 1 | 283,364 | 1,079,855,991 | 38 | Jur. Clastic ls. |
| Abu Hadriya | 1940 | | 10,115 | | | 1 | | | 9,579 | 36 | Jur. Clastic ls. |
| Dammam | 1936 | 11,600 | 4,850 | [2]27 | | 3 | | 50,607 | 327,548,383 | 35 | Jur. Clastic ls. |
| Fadhili | 1949 | 1,900 | 9,850 | | | 1 | | | | 38 | Jur. Clastic ls. |
| Ghawar | 1948 | 502,900 | 7,125 | 65 | | 37 | 1 | 581,950 | 652,644,391 | 35 | Jur. Clastic ls. |
| Qatif | 1945 | 21,300 | 7,350 | 9 | | [3]1 | | 28,391 | 65,431,247 | 35 | Jur. Clastic ls. |
| Safaniya | 1951 | 69,300 | 5,560 | | | 15 | [4]1 | | | 27 | Cret. ss. |
| Total Saudi Arabia | | | | 147 | | 76 | 3 | 944,312 | 2,125,489,591 | | |

(1) Includes two gas injection wells. (2) Includes three producing gas wells. (3) Well being repaired. (4) One well being deepened.

**SAUDI ARABIA REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Arabian American Oil Co., Dhrahan—Ras Tanura | 189,000 | | 24,000 | R-12,500, P-1,000, A-500 |

**ADEN REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Aden Petroleum Refinery, Ltd., Brittanic House, Finsbury Circus, London—Aden | 120,000 | | | R-12,000, Hydro-3,500 |

billion barrels of oil and at the end of the year was well on its way toward the third billion in spite of decreased production during the year.

Arabian American Oil Co. added a 12,500-bbl.-daily Hydroformer to its mammoth Ras Tanura refinery during the year and can boast of increased output of high-octane gasolines.

The company drilled the deepest wildcat ever drilled in the Middle East. It was a dry hole, but nevertheless it was the area's deepest hole—almost 13,000 ft. The test can also claim the dubious distinction of being one of the world's most remote and isolated wildcats. It is located about 200 miles south of the Uthmaniyah section of the Great Ghawar field and is on the northern edge of the great sand desert which covers southeastern Saudi Arabia, Rub al Dhali, or the "Empty Quarter."

**Five Areas Form Giant Producing Trend**

During the past year it has been generally conceded that five productive areas, each a major field in its own right, form a single giant producing trend which can actually be considered as a single Ghawar field. The trend stretches from Ain Dar southward about 130 miles to the Haradh area. A little more than 60 per cent of Saudi Arabi's average daily production came from this region in 1955 and from only 65 wells.

As 1955 ends, Aramco is engaged in a major construction program to open a new producing area. The company is building a 150-mile, 21-in. pipeline from the country's offshore field, Safaniya, near the Neutral Zone border. The line will have the capacity to carry 150,000 bbl. daily of Safaniya's 27°-gravity sweet crude.

The field has 16 completed wells, all but 2 of them drilled in the Persian Gulf from a large diesel electric drilling barge.

Aramco has set the 50-50 profit sharing pattern in the Middle East with its 1950 agreement to give the Saudi Arabian Government a larger slice of the oil profits. The agreement, however, hasn't halted the further demands of the government. Negotiations over issues, both political and economic, are being carried on almost constantly by the company and the government.

The biggest issue, and one still not absolutely solved in every respect, concerns doing away with the concession holder's offtaker discount on crude produced in the country. Aramco officials say guardedly that some details remain to be worked out, but in the broad principle, the company now has only a 2 per cent discount on the posted price of Saudi Arabian crude instead of the much larger discount it once had. The difference is going into the Saudi Arabian treasury.

Saudi Arabian crude of 35° gravity is priced at $1.95. A 2 per cent discount would bring this down to $1.91 for Aramco's parent companies compared to the $1.62 a barrel they paid under the customary discount.

One of the biggest strains in the relationship between the company and the government has been submitted to arbitration in Geneva. This is the controversial agreement between Saudi Arabia and A. S. Onassis, Greek shipping tycoon. The agreement called for Onassis to incorporate part of his huge tanker fleet in Saudi Arabia and gain preference in the shipment of crude from the country—to the eventual near-exclusion of all other shippers. The agreement raised a storm of protest in the oil industry, drew the condemnation of several western governments, and caused Aramco to invoke the arbitration clause of its concession contract.

Dr. Saba Habashi, an Egyptian attorney, represents Aramco at the arbitration which began last summer at Geneva. The Saudi representative is Dr. Helmy Bahjat Badawi, former Egyptian Government official. A Swiss legal expert on international law, Dr. Georges Sauser-Hall, was selected as the third and neutral member of the panel.

The Saudi Arabian concession is operated by Aramco, completely American owned, and is the only company operating in the country. Standard Oil Co. of California, which made the original discovery in 1938, holds 30 per cent of Aramco with The Texas Co. and Standard Oil Co. (N. J.) owning 30 per cent each. The remaining 10 per cent is held by Socony Mobil Oil Co., Inc.

Up to this year Aramco ranked as the world's largest oil-producing company and Saudi Arabia the world's fourth oil country, led only by United States, Venezuela, and Russia. In 1955 Aramco gives up that ranking to Kuwait Oil Co., Ltd., (B.P.-Gulf) and Saudi Arabia relinquishes its standing to its neighbor Kuwait.

## Territories of Southern Arabia . . .

**ADEN**

| | | | |
|---|---|---|---|
| Area, sq. miles | 75 | Currency | Shilling |
| Population | 82,000 | Value | $0.1413 |
| Refining cap., B/D | 120,000 | | |

**SULTANATE OF MUSCAT AND OMAN**

| | | | |
|---|---|---|---|
| Area, sq. miles | 82,000 | Capital | Muskat |
| Population | 550,000 | Currency | Indian Rupee |
| Value | $0.212 | | |

**YEMEN**

| | | | |
|---|---|---|---|
| Area, sq. miles | 75,000 | Capital | Sana |
| Population | 5,000,000 | Currency | Riyal |
| Value | $0.2725 | | |

THE small shaikhdoms which fringe the southern end of Arabian Peninsula jumped into a prominence during 1955 that they have never known outside their immediate geographical location.

Oil exploration and the promise of more to come in several different areas have pushed the small tribal kingdoms into the limelight and in one case into armed conflict between rival claimants to territory. Politically most of the small states are under the protection of the British through treaties. Long-simmering disputes over territorial boundaries erupted in gunfire when British-led Arab soldiers from Abu Dhabi expelled Saudi Arabian troops from the disputed Buraimi Oasis.

The battle took place after arbitration efforts to settle the boundary dispute collapsed when the British representative walked out of arbitration meetings in Geneva, charging Saudi Arabia had engaged in large-scale bribery to gain the territory. This charge was later voiced in London by the British Foreign Office. Last month the British flatly rejected suggestions by Saudi Arabia that the arbitration by a neutral commission be resumed.

The controversy points up what could well occur in several different locations in Southern Arabia where boundaries are largely undefined. In the past the friction has existed, but with oil exploration going on in more areas, the boundaries become more important.

An Iraq Petroleum Co. subsidiary is drilling at Gezira in Abu Dhabi after completing a well at Murban, a little more than 100 miles to the east. The Murban well had oil shows, but was not regarded as commercial. The same company is preparing to drill at Jebel Fahud, in the remote and almost uninhabited interior of Oman to the south. Drilling equipment is being flown to the well site, an outcrop in an area of stony, waterless desert, and the well is expected to be spudded early in 1956.

The newest operation to this area is the Dhofar test of Cities Service Co. on a 32,000-sq.-mile concession it holds jointly with Richfield Oil Corp. The well, about 160 miles north of the Arabian Sea coast and north of the rugged Qara Mountains, is drilling below 11,500 ft. Cities Service says it will keep drilling as long as the hole remains in sedimentary rocks. The company wants the deep stratigraphic test to give up as much geological information as possible.

The most recent development in Southern Arabia concerns Yemen, across the peninsula to the west. Late in November, Imam Ahmad granted a newly organized American company a 40,000-sq.-mile exploratory concession covering the northern two-thirds of his ancient kingdom.

Walter S. Gabler, president of the newly formed Yemen Development Co., says exploratory work will start early in 1956. Gabler, Washington foreign-investment specialist, helped organize International Egyptian Oil Co. which is now developing Belayim and Feiran fields of Egypt's Sinai Peninsula. Chairman of the board of Yemen Development is George E. Allen, former chairman of Reconstruction Finance Corp. and personal friend of President Eisenhower and former president Truman.

### Customary 50-50 Split Called For

The concession calls for the customary 50-50 profit split if production is obtained and the agreement can be voided if no oil is found within 6 years. It was signed by the 63-year-old absolute ruler of the Yemenites after 3½ weeks of negotiations with the Americans. The move is significant because it is the first concession granted by the ancient country.

The German firm, C. Deilmann Bergbau, GmbH., has been doing preliminary geological work in Yemen for the past 2 years under a contract with the Yemen Government which expires in 1958. Dielmann's work has been confined to the coastal area and is a joint operation with the government paying 75 per cent of exploratory costs and taking a 75 per cent share of any production that is found.

The crown colony of Aden, which shares the southwest tip of the Arabian Peninsula with Yemen, is the site of British Petroleum Co., Ltd.'s, 120,000-bbl. Aden refinery, which completed its first year of operation this past summer.

The refinery serves a large bunker trade as well as British Petroleum's export markets and was a major step in the program of B.P. to replace the refining capacity lost when Abadan was nationalized. The refinery includes two electronically controlled distillation units, an Autofiner, and a 12,000-bbl.-daily Platformer. B.P. disclosed that the refinery processed 25,500,000 bbl. of crude hauled by more than 200 tankers from the Persian Gulf in its first year of operation. About 40,000 bbl. daily of ships' bunker fuels are pumped 19 miles through two pipelines from the refinery to the Aden bunkering station.

## Turkey . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **296,503** | **Value** | **$0.3575** |
| **Population** | **21,000,000** | **Refining cap., B/D** | **6,950** |
| **Capital** | **Ankara** | **Production, B/D** | **3,500** |
| **Currency** | **Pound** | **Producing fields** | **2** |
| | **Reserves, bbl.** | **65,000,000** | |

THE opening of Turkey to development by foreign oil companies gained momentum this year as more firms took out exploration permits, and the government amended the 1954 oil law to make it more attractive to foreign capital.

The roster of companies carrying on preliminary work under nonexclusive reconnaissance permits includes: Standard Oil Co. (N.J.); Socony Mobil Oil Co., Inc.; Royal Dutch-Shell; American Overseas Petroleum, Ltd. (Caltex); Cities Service Middle East Corp.; Tide Water Associated Oil Co., and Gilliland Oil Corp., a Los Angeles independent. These permits allow prospecting over the entire country with the exception of sections bordering the Iranian and Russian borders. Two firms are exploring in Thrace in European Turkey. They are Huskey Oil Corp., and a German firm, C. Deilmann Bergbau.

Ralph M. Parsons Co., Los Angeles, which constructed the 6,250-bbl.-daily refinery at Batman, holds 70 per cent interest in Murefte Natural Gas Co. The refining interest in the firm is held by the city of Istanbul, 20 per cent, and Turkish National Petroleum Co., in which the government holds majority interest, 10 per cent. Kern Oil Co., Ltd., a British firm with interests in Trinidad and California, had a permit but has now stopped work.

The oil law amendments cleared up uncertainties and liberalized some points in the original legislation. Main features of the law include the 50-50 profit-sharing principal and a 27½ per cent depletion allowance. Among the changes, the maximum time allowed between acquiring a license and starting drilling was extended from 3 to 5 years. As before, if companies find oil they must produce it. But the rule has now been eased so that costs of production must be considered if deferment is requested. Applications for exploration licenses for drilling on an exclusive basis will be accepted when administrative details of the law are issued. These are expected soon.

Turkey's small but rising crude production comes from

**TURKEY PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Garzan | 1951 | 286 | 4,650 | | | 6 | | | | 26.7 | Cret. ls. |
| Raman | 1945 | 815 | 4,500 | | 12 | 2 | 4 | 3,500 | 453,000 | 20.5 | Cret. ls. |
| Total Turkey | | | | | 12 | 8 | 4 | 3,500 | 453,000 | | |

**TURKEY REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Turkive Petrolleri A.O. (Turkish Petroleum Corp.), Gazi M. Kemal Blv. 6/1 Kizilay, Ankara—Batman | 6,950 | 3,000 | | V-3,100, A-1,400 |

Raman field in the southeastern part of the country. The field is being developed in conjunction with the refinery which has recently gone on stream. Ouput from Raman is small by world standards, but it is rising rapidly. Output for the first 6 months of this year averaged about 2,600 bbl. daily compared to the 1,090-bbl.-daily average for last year. July production was 6,400 bbl. daily. Two years ago the field produced only about 500 bbl. daily. The producing area and the refinery are state controlled. The government company is the successor to M.T.A. Institute, which until last year held a monopoly on oil activities with the exception of marketing.

Oil imports are among the flock of economic troubles currently besetting Turkey. As with other types of imports, Turkey has defaulted on payments for its oil. The country owes about $40,000,000 to marketing subsidiaries of Socony Mobil, Caltex, Shell, and British Petroleum Co. Ltd. Most of the sum is owed Socony Mobil. At the present time, companies are selling oil to Turkey on a "cash only" basis.

Construction on a 450-mile, 4, 6, and 8-in. products pipeline began in September. The $15,000,000 line will serve North Atlantic Treaty Organization air bases. The line will extend from Iskenderun, in southern Turkey, northeast to Batman. Associated Pipe Line Contractors, Inc., Houston, is contractor on the project.

# EUROPE

## Austria . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 32,369 | Value | $0.0390 |
| Population | 6,700,000 | Refining cap., B/D | 30,000 |
| Capital | Vienna | Production, B/D | 57,500 |
| Currency | Schilling | Reserves, bbl. | 400,000,000 |

THE most important change in European oil affairs in 1955 was Russian withdrawal from the industry in Austria. The transfer of oil properties to the Austrian Government on August 13, under terms of the state treaty signed by the United States, Great Britain, France, and Russia, placed the industry under local jurisdiction for the first time since 1938.

The Soviets handed over oil fields which produce around 60,000 bbl. daily, the greater part of the country's output. Five refineries also were returned, as well as the marketing organization, O.R.O.P., which held a monopoly in Vienna and in the Soviet Zone.

A high price was paid for the properties. Under the treaty, Austria must deliver 10,000,000 tons of crude, around 20,000 bbl. daily, to Russia over the next 10 years. Another 200,000 tons a year for 6 years must be sent to Russia as partial payment for other assets. The first installment, 100,000 tons of crude, was shipped by rail less than a month after Russia releasd its grip.

Whether or not investments held by foreign oil companies are returned to private ownership is a decision faced by the Austrian Government. In 1946, the Parliament passed an act nationalizing the industry. Further, the Treaty Act stipulates that concessions may not be held by former owners. However, the Austrian Government has said it would attempt to reach an agreement mutually satisfactory with concession operators and which would help develop oil resources. At present, the industry is directed by four government appointees heading the Austrian Mineral Oil Association (A.M.O.A.). The members are Franz Primas, who is expected to head the national company if one is formed; Dr. Karl Friedl, a geologist; Hans-Georg Ulrik; and Paul Pradstetten. Meanwhile, western companies have adopted a "wait-and-see" attitude before deciding on any direct action.

Before the war, concession holders included Royal Dutch-Shell and Socony Mobil Oil Co. (Socony-Vacuum), through 50-50 ownership in Rohoelgewinnungs, A.G. (R.A.G.), and a Canadian operator, Col. R. K. Van Sickle. These areas were taken over as virtual prizes of war first by Nazi Germany and then by Russia. During the Russian occupation, a few small fields were operated by R.A.G. and Van Sickle. They were required to sell their output to the Soviet Mineral Oil Administration at a fixed price. The main properties at stake at the present time are fields and exploration areas developed since 1938 on areas under concession to western companies. Two of these new fields, Matzen and Aderklaa, account for most Austrian production. Many discoveries were made on areas actually mapped out by foreign companies prior to 1938.

Seven small refineries with a total capacity of around 30,000 bbl. daily make up the Austrian refining industry. All of these plants were in the Soviet Zone. Two of them were operated by western owners during Red occupation. These were the Socony Mobil plant at Kagran and Shell's plant at Floridsdorf. Shell and Socony Mobil also own a plant at Lobau. Shell and Standard Oil Co. (N.J.) have interests in a refinery at Korneuburg. French interests have a share in another refinery, at Schwechat.

Reserve estimates for the Vienna basin made by Austrian officials almost immediately after the fields were returned by the Russians were considerably above previous figures. These estimates of 350,000,000 to 700,000,000 bbl. reserves for eastern Austria were received with more than a little skepticism. However, the Austrian Oil Administration estimated last month that the country's reserves are now at least 700,000,000 bbl.

Austria's gas reserves are estimated to be the equivalent of 105,000,000 to 140,000,000 bbl. of fuel oil in calorific value.

The only concrete information on Austria's reserves available to the international companies which once operated the country's major fields predates the Nazi and Russian occupation of the country. Those reserve estimates ranged from 180,000,000 to 230,000,000 bbl.

## Belgium . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 11,775 | Value | $0.0199 |
| Population | 8,700,000 | Currency | Franc |
| Capital | Brussels | Refining cap., B/D | 130,100 |

THE refining capacity of Belgium was enlarged this year by about 25,000 bbl. daily with the modification of the distillation unit at the country's largest refinery, the plant of Soc. Industrielle de Petroles at Antwerp. Besides an increase in capacity at the refinery, a 10,000-bbl.-daily vacuum-distillation unit, a 3,000-bbl.-daily polymerization unit, and a 10,000-bbl.-daily catalytic cracker were added. The plant is jointly owned by British Petroleum Co. Ltd. and Cie. Financiere Belge des Petroles, S.A. (Petrofina).

Of the seven other refineries in Belgium, which range from small topping units to complete, large-capacity plants, foreign firms have interests in two. The larger of these is the 25,000-bbl.-daily plant of Esso Standard Refinery, S.A., located on the Scheldt River near the S.I.B.P. plant. Belgium Shell has a 1,900-bbl.-daily refinery at Ghent, which processes topped crude.

Soc. Chimique des Derives du Petrole, owned by Belgian interests including Petrofina, is building an $8,000,000 petrochemical plant. It will manufacture ethylene oxide, ethylene glycol, and other products from refinery gases in the Antwerp area. Operations are scheduled to begin next year.

Petrofina, a petroleum holding company with controlling interest in companies in Europe, Africa, Canada, and Mexico, has extended its operations considerably in recent years. In 1955, the company planned to increase its capital by about $14,000,000 through issuance of shares to stockholders. This would bring its total capitalization to about $32,000,000.

## France . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **212,659** | **Value** | **$0.0028** |
| **Population** | **42,250,000** | **Refining cap., B/D** | **526,300** |
| **Capital** | **Paris** | **Production, B/D** | **18,200** |
| **Currency** | **Franc** | **Producing fields** | **6** |
| | **Reserves, bbl.** | **120,000,000** | |

STEPPED-UP interest in exploration was a highlight of the French oil industry this year.

This development resulted from Esso Standard, S. A. F.'s Parentis discovery last year in southwestern France, the largest field so far discovered in Western Europe. Companies have now applied for exploration permits covering about one-quarter of France, mostly in the vicinity of the Parentis concession and in the Paris basin.

Along with local government-sponsored firms, major companies which have applied for permits are Royal Dutch-Shell, Socony Mobil Oil Co., Inc., Caltex, and British Petroleum Co., Ltd., as well as Esso Standard. In the Paris basin, where there is considerable overlapping of applications, the government has granted a permit for a joint operation by two companies. They are a Caltex subsidiary, American Overseas Petroleum France S.A.F. (Amefrance), and Ste. Nationale des Petroles du Languedoc Mediterranean.

A further spur to exploration this year was the relaxation of stringent regulations. The chief stumbling block to foreign entry, the rule requiring large French participation in a concession, remains in effect. But other changes simplified the law. As in the past, a permit is good for 5 years, but it may now be renewed for two 3-year periods instead of one. A concession holder now has the right to select the portion of his concession he will retain after renewal. Exploring companies have had their choice in actual practice, but heretofore it was not a legal right. Another change made expenditure requirements on concessions more flexible.

Development work in Parentis field has brought production to about 22,000 bbl. daily, more than double the total output of all other fields in France and its possessions. Esso Standard, owned 63.2 per cent by Standard Oil Co. (N.J.) and 18.35 per cent by Gulf Oil Corp., made the discovery in March 1954. As of July 1 this year, a total of nine wells were drilled on the Parentis structure. A well on the southeast side of the structure was dry, and only limited traces were found in a well drilled on the west side of the Lake of Biscarosse. A well drilled in the lake a mile offshore had promising shows. Another well at Mothes, 9 miles east of Parentis, struck a deposit of lighter-gravity crude than at Parentis, which is about 32° A.P.I.

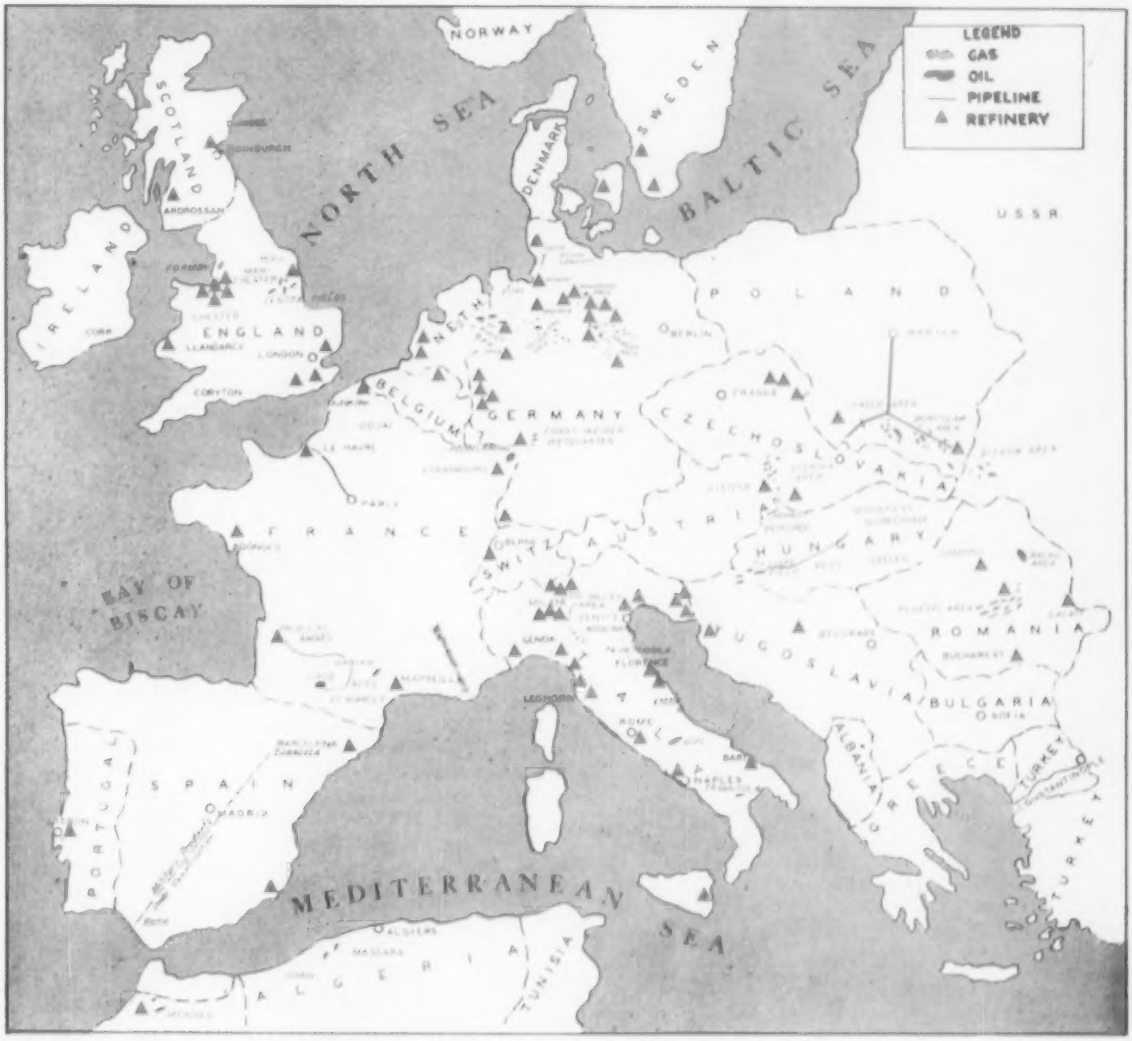
Esso Standard has automatically acquired a 50-year development concession. Royalty payments are made on

**BELGIUM REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Albatross S.A. Belge Pour le Raffinage de Petrole, 10 Petroleumkaai, Antwerp-Kiel—Antwerp | 12,000 | 3,600 | | P-500 |
| Belgian Shell Co., S.A. 47 Cantersteen, Brussels—Ghent | 3,000 | | | |
| Cie. Industrielle "Atlas" S.A., 101 Ave. de France, Antwerp—Hoboken | 2,100 | | | |
| Esso Standard Refinery, S.A°, P.O. Box 386, Antwerp | 32,000 | 10,000 | 4,270 | |
| Raffinerie Belge de Petroles S.A., 115 Ave. de France, Antwerp—Antwerp | 12,500 | | 4,200 | |
| Raffineries et Distilleries Anversoises 10, Place Leopold, Antwerp—Anvers-Kiel | 3,500 | | | V-4,000, R-900 |
| Ste. Industrielle Belge Des Petroles, Boite Postale No. 55, Antwerp—Kruisschans, Wilmarsdonk | 65,000 | 10,000 | 6,000 | V-19,000, P-3,000 |
| Total Belgium | 130,100 | 23,600 | 14,470 | |

**FRANCE PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gallician | 1951 | | 6,000-7,000 | 1 | 1 | 5 | | | 22,000 | | Olig. sd. |
| Lacq | 1949 | | 2,100-2,400 | 15 | 6 | 9 | | | 7,500,000 | 22.0 | Cret. ls. |
| Mothes | 1955 | | 8,000 | 1 | | | 1 | 360 | 19,000 | 22.0 | Cret. ls. |
| Parentis | 1954 | | 7,000-8,000 | 6 | 1 | 2 | 3 | 12,000 | 2,460,000 | 33.0 | Cret. dol. |
| Pechelbronn | 1813 | | 600-4,000 | 4 | 461 | 98 | | | 22,250,000 | | Olig. dol., Jur., Tri. |
| Staffelfelden | 1952 | | 6,000-7,000 | 4 | 2 | | | | 385,000 | | Jur. l. |
| Total France | | | | 31 | 471 | 114 | 4 | 18,200 | 32,636,000 | | |




## EUROPE

**. . . second largest world market expands indigenous supplies both in refining and production.**

### FRANCE REFINING

| Company and address—Refinery location— | Barrels per stream day | | | |
|---|---|---|---|---|
| | Crude distillation | Cat. cracking | Thermal operations | Special processing |
| Cie. Francaise de Raffinage, 11 Rue Dr. Lanceraux, Paris 8: | | | | |
| Gonfreville | 64,800 | | 17,400 | |
| La Mede | 56,000 | 10,000 | 10,000 | |
| Cie. Raffinage Shell-Berre, Rue de Berre, Paris 8: | | | | |
| Berre l'Etang | 75,000 | 10,000 | 9,000 | |
| Pauillac | 12,000 | | | |
| Petit Couronne | 50,000 | 5,200 | 8,500 | |
| Esso Standard, S.A., Francaise, 82 Ave. des Champs, Elysses, Paris 8— | | | | |
| Port Jerome | 75,000 | 10,000 | 11,500 | |
| Pechelbronn, S.A., d'Explorations Minieries, 4 Rue Leon Jost, Paris 17—Merkwiller | 4,200 | | | |
| Raffineries Francaise des Petroles, de l'Atlantique Donges-St. Nazaire—Donges | 35,000 | 7,500 | 3,600 | |
| Ste. des Raffineries de Petrole de la Gironde, 7 Palace Vendome, Paris 1er—Bec d'Ambes, Gironde | 16,500 | 4,600 | 3,600 | [1]V-6,300, [1]P-540 |
| Ste. Francaise des Petroles BP, 21 Rue de la Bienfaisance, Paris: | | | | |
| Dunkirk | 45,000 | | 6,800 | V-9,000, L-1,600 A-2,000 |
| Lavera | 50,000 | | 5,000 | R-6,000 |
| Socony-Vacuum Francaise, 46 Rue de Courcelles, Paris, 8: | | | | |
| N.D. de Gravenchon | 17,300 | | 3,140 | |
| Frontignan | 25,500 | 9,000 | 3,380 | |
| Total France | 526,300 | 56,300 | 81,920 | |

(1) To be on stream in 1957.

a graduated scale, ranging from 6 per cent from 1,000 to 2,000 bbl. daily to 14 per cent for 20,000 bbl. daily and over. France has a 27½ per cent depletion allowance with the provision that the tax deduction must be invested in further exploration work in France or its territories within 5 years.

Ste. Nationale des Petroles d'Acquitaine carried out production tests this year in the deep Lacq gas field, which underlies a small oil field. Indications are that the pay zone is at least 2,500 ft. thick and the field may cover as much as 10,000 acres. Because of high sulfur content of the gas, development plans call for a desulfurization plant with a capacity of about 35,000 M.c.f. daily. A gasoline-extraction plant also will be built.

Both Lacq and Parentis fields are located in the Acquitaine basin. Seismic work has indicated the presence of several Lower Cretaceous structures between the two areas. Most of the remaining French production comes from Pechelbronn and Staffelfelden fields in Alsace basin in northeastern France. Pechelbronn has produced oil since 1813 and for many years crude was mined from shallow depths.

Because of its increasing domestic production and its interest in Middle East fields, France is obtaining an increasing supply of crude without spending dollars in foreign exchange. Cie. Francaise des Petroles holds a 23¾ per cent share in Iraq Petroleum Co., Ltd., and a 6 per cent share in Iranian Oil Participants, Ltd.

Inland consumption in France averaged 300,000 bbl. daily during the first 6 months, up 11 per cent over the same period last year. Fastest growing demand is for premium gasoline and light fuel oil, mostly for domestic use. Unlike most European countries, demand for heavy fuel oil was up only slightly, 1.3 per cent in this period. This was due to a tax on heavy fuel oil aimed at decreasing the competition with coal. Another factor was an increase in available hydroelectric power stemming from heavy rainfall and expanding facilities.

France was the first European country to follow a policy of home refining. Its plants met domestic demand as early as 1938, and a buildup took place in the years following World War II. Nearly all processing is carried on by subsidiaries of the major international companies. These include Jersey Standard, Shell, Socony Mobil, Caltex, British Petroleum, and C.F.P. Special units planned for existing refineries include a 5,200-bbl.-daily catalytic cracking unit at the 50,000-bbl.-daily plant of Cie. Raffinage Shell-Berre at Petit Couronne, near Rouen. A 10,800-bbl. Houdriformer will be added at the 35,000-bbl.-daily plant of Antar-Petroles de l'Atlantique located in Donges.

# Italy . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **116,228** | **Value** | **$0.00162** |
| **Population** | **46,600,000** | **Refining cap., B/D** | **455,600** |
| **Capital** | **Rome** | **Production, B/D** | **4,200** |
| **Currency** | **Lira** | **Producing fields** | **5** |
| | **Reserves, bbl.** | **110,000,000** | |

ACTIVITY in Italy during 1955 indicates the country could become the first nation in Western Europe to be self-sufficient in oil if her potential has the proper development.

The "if" involved in that statement looms large in Italy today in a continuing political tug-of-war over whether private capital should be allowed to develop her oil or if it should be done by Ente Nazionale Idrocarburi, the state-controlled agency. Four oil discoveries were made on the Italian mainland in 1955. They are the first major discoveries for Italy outside small and erratic production in the Po Valley where the country's gas is produced.

The first of those 1955 discoveries, and the most significant, was made by private capital. It was followed closely by three in the same general region along the Adriatic coast by Azienda Generale Italiana Petrolio, a subsidiary of E.N.I.

The discoveries have served only to add fuel to the private capital-vs.-state argument that has raged in Italy's political circles for months. The present law covering oil exploration and production is an archaic mining law that dates back to 1927. It offers a foreign investor no assurance that he will be allowed to produce and sell any oil he finds. A related piece of oil legislation was passed in 1953. It created E.N.I. and granted the state agency exclusive rights to explore for oil in the Po Valley, the area that has always been regarded as Italy's most favorable.

When Antonio Segni took office as Italy's new premier last summer, he said a new oil law for the country would be one of his first aims. The oil bill has been approved by Segni's cabinet, but in its present form it leaves a lot to be desired as far as foreign oil companies are concerned. It calls for a 60-40 split of oil profits with the Italian Government taking the big share. If this legislation is passed by the Italian Parliament, the country will be given a wide berth by companies who already operate in other areas of the world. To accept such terms would mean an automatic revision of agreements in every other country where companies operate on a 50-50 basis. The profit-split provisions of the bill are generally regarded as political trading material for use in parliamentary debate. Few observers feel that the government has any real intention of sticking to the 60-40 split. To do so would be a very effective method of shutting out the foreign capital the Italian industry needs for full-scale development.

### Year's Most Significant Discovery

The year's most significant discovery was made at Cigno near the Adriatic coast 100 miles east of Rome last February. The well was drilled by Petrosud, S. A., jointly owned by Gulf Oil Corp. and Montecatini Mining & Chemical Co., an Italian firm. Cigno 1 tested 2,000 bbl. daily of 34°-gravity crude from a Mesozoic limestone formation at 2,300 ft. An offset, 1,650 ft. to the north, was completed below 2,600 ft. and is just as good a well as the first. Neither has been produced because the government has refused to grant Petrosud an exploitation concession.

Less than 2 miles to the southeast of the two Cigno wells, AGIP brought in Vellecupa 1 from about 1,690 ft. No production data on the well have been revealed, but the government granted AGIP a temporary permit to produce about 15,000 bbl. from the well. Petrosud has been unable to obtain any such permit.

The second discovery claimed by AGIP was in October at Cerni, inland from the Adriatic town of Vasto about 35 miles. Vasto is about 25 miles south of the Petrosud area in the Abruzzi mountains. The third well claimed by AGIP was in mid-November and is less than a mile from Vallecupa 1. The government said the well, Madonna della Croce 1, encountered a productive formation at about 1,960 ft. It is being deepened to its projected depth of 4,500 ft. This well was drilled by the Somicen Co., an affiliate of AGIP. Somicen is drilling two more wells in

the Vallecupa area and will drill a stepout to the Madonna della Croce 1.

In addition to this drilling activity, AGIP is exploring the lower Po Valley. It has one rig at Codigoro and another at Casaglia.

Sicily has shown a marked contrast to the Italian mainland. Semiautonomous Sicily has its own oil law which is favorable to private capital. Three international companies are drilling in Sicily and one of them, American International Fuel & Petroleum Co. (Gulf), is developing a major oil field at Ragusa. The company has completed nine wells in the field in southwestern Sicily and is shipping crude to the Augusta refinery of the Italian RASIOM company by tank car. It expects to complete 22 wells in the field by the end of 1956.

Augusta Ricerche Petrolifere, S.p.a., a Standard Oil Co. (N.J.) subsidiary is drilling wells on two of its three exploration blocks in eastern Sicily. One, Melilli No. 1, is 7½ miles southwest of Augusta, on the company's Augusta block. The other, Bronte No. 1 on the Gioitto acreage, about 9 miles west and north of Mt. Aetna.

British Petroleum's D'Arcy Exploration Co. is drilling in the Vittoria area about 12 miles from Ragusa.

The AGIP-controlled MISO company has drilled at

**ITALY PRODUCTION**[1]

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cortemaggiore | 1949 | | 6,230 | 20 | | 9 | | | | 35 | M. Mio. ss. |
| Ripi | | | | | | | | | | | |
| S. Giorgio | | | | | | | | | | | |
| Tramutola | | | | | | | | | | | |
| Ragusa (Sicily) | 1953 | | 6,000 | 4 | | | | 3,000 | 323,000 | 12-16 | |
| Total Italy | | | | 24 | | 9 | | 4,200 | 3,700,000 | | |

(1) Production in northern Italy by field is not listed by the state operating company, Azienda Generale Petroli Italiana. Another field discovered by Petrosud (Gulf and Montecatini) is Pescara and is presently shut in.

**ITALY REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| A.G.I.P. Minearia S.P.A., Via Fratelli Gabba 1, Milan—Cortemaggiore | 3,000 | 2,250 | | |
| Anonima Petroli Italian, Falconara—Falconara | 13,500 | | 3,000 | V-3,500 |
| Aquila Societa Technico-Industriale, Via Dante 5, Trieste—Aquila, Trieste | 15,000 | | 3,500 | |
| Condor S.P.A. per l'Industria Petrolifera e Chemica—Rho | 45,000 | 15,000 | | |
| Delle Paine, Genoa—Genoa | 1,000 | | | |
| Distilleria Italiana Catrami—Carrara | 3,000 | | 500 | |
| Esso Standard Italiana, Via Assarotti 40, Genoa—Trieste | 6,000 | | 1,000 | [2]R-1,000, L-1,400, A-1,820 |
| Galetti—Florence | 3,700 | | 750 | |
| Garrone—Genoa | 4,100 | | 1,900 | |
| Industria Raffinazione Oil Minerali, "IROM" S.p.A., Casella Postale 64, Venezia Mestre Stazione, Venice—Venice | 30,000 | | 7,600 | V-7,000, P-1,400, L-300, A-450 |
| Industrie Chimiche Italian del Petroleo—Mantova | 10,000 | 4,000 | | [2]R-2,000 |
| I.L.S.E.A., Como—Como | 2,400 | | 250 | R-500 |
| I.P.L.O.M., Genoa—Genoa | 1,000 | | | |
| Lombarda Petroli, Milan—Milan | 5,000 | | 2,500 | |
| Nazionale Industria Oli, Iubrificanti, Milan—Milan | 1,500 | | 500 | |
| Purfina Italiana, S.p.A., Corso Matteotti 10, Milan: | | | | |
| Florence | 3,500 | | 600 | |
| Genoa | 11,000 | 1,500 | | A-1,100 |
| Milan | 7,000 | | | V-3,000, L-350, A-1,050, R-500 |
| Rome | 10,000 | 1,500 | | R-500, A-1,250 |
| Petroli d'Italia, Fiorenzuolla, d'Ardia, Emilia—Piacenza | 6,000 | | 2,500 | |
| Raffinerie Sicilane Oli Minerali, Rasiom, Augusta, Sicily—Augusta | 44,000 | 10,000 | 8,200 | R-2,500, A-1,500, P-1,000 |
| Raffineria Oli Lubricanti, Viguzzolo—Viguzzolo | 2,000 | | | |
| San Quirico—Genoa | 2,500 | | | |
| S.A.R.O.M., Ravenna—Ravenna | 13,500 | | 2,400 | |
| S.I.R.O.M., Milan—Milan | 1,500 | | | |
| Sta. Per Azioni Raffineria Padana Olii Minerali, Piazza San Carlo, 161, Turin—Novara | 13,300 | 2,880 | 3,150 | V-5,150, P-315 |
| Sta. per l'Industria Italiana del Petrolio, Genoa—La Spezia | 32,000 | | 2,800 | R-9,000 |
| Sta. Petrolifera Italiana, Parmo—Farnovo Taro | 2,500 | | | |
| Socony-Vacuum Italiana Casella Postale 1492, Geneva, Italy—Naples | 72,000 | 22,000 | 2,700 | L-400, A-300, P-900 |
| Stanic Industria Petrolifera, Rome: | | | | |
| Bari | 45,000 | | 4,500 | V-4,000, L-1,200, A-25,000 |
| Leghorn | 41,500 | 3,700 | 8,900 | A-6,200 |
| S.T.C.I. Via Pietro Fanfani, 129 Firenze—Firenze | 2,000 | | 1,000 | |
| Dott G. Volpato & Co. S.p.A., Milan—Milan | 2,100 | | | |
| Total Italy | 455,600 | 62,830 | 58,250 | |

(1) To be completed in 1957. (2) To be completed in 1956.

least 10 wells in the plane of Catania and nine of the wells are producing natural gas.

In Italy's Po Valley, AGIP's exploration and development drilling has been largely confined to natural gas. The valley now boasts several gas fields and a grid of pipelines furnishing natural gas to most of northern Italy's industrial centers. The area's reserves of gas have been estimated as at least 2.1 trillion cubic feet. During the first half of 1955, the Italian natural-gas production was an average of 53,000 M.c.f. daily, a gain of 20 per cent above the average production for the previous year.

Italy's refining industry is vastly overbuilt, but the wide gap between capacity and actual need is still widening. The industry's capacity is estimated at more than 450,000 bbl. daily and the country's domestic consumption of petroleum is about one-third that figure.

For several years the industry has tried to correct the overbalance in refining from two different fronts. It has tried to increase its exports and at the same time boost domestic consumption. It has made gains with its export program, but the bottleneck of Italian gasoline prices—among the highest in the world—has pretty well throttled effective increases in consumption.

During the first 6 months of 1955 throughput of the refining industry averaged about 337,000 bbl. daily, an increase of about 9 per cent over the comparable period of 1954, but still far below full capacity.

# Netherlands . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **15,450** | **Value** | **$0.2622** |
| **Population** | **10,350,000** | **Refining cap., B/D** | **237,000** |
| **Capital** | **Amsterdam** | **Production, B/D** | **18,465** |
| **Currency** | **Guilder** | **Producing fields** | **5** |
| | **Reserves, bbl.** | **95,000,000** | |

THE Netherlands is important from the oil industry's standpoint both as a consumption and refining area. Demand for products rose to about 67,000 bbl. daily this year, against 61,000 bbl. daily in 1954. Another 29,000 bbl. daily of bunker fuel was pumped aboard ocean-going vessels. Fuel and diesel oils are the most important fuels in inland demand, accounting for about two-thirds of domestic consumption. Motor gasoline is the third ranking product and demand increases yearly. Autocycles are becoming increasingly popular in Holland and the nation is first in international road traffic. Early this year, propane was made readily available as a motor fuel by the opening of a dozen stations. Plans were made for the opening of several more.

Royal Dutch-Shell's 200,000-bbl. daily refinery at Pernis is the largest in Europe. The refinery is operated through N.V. de Bataafsche Petroleum, Mij. This year, a 33,000-bbl.-daily fluid catalytic cracking unit was completed, bringing the total cat cracking capacity to around 65,000 bbl. daily. A $3,000,000 plant for the production of the insecticides aldrin and dieldrin has been built. Manufacture of another insecticide, endrin, is expected to begin in mid-1956. The refinery also will be the site of the first synthetic glycerin plant to be built outside the United States. The plant is expected to be ready in in 1957. It will use refinery gases. Production of epoxide resins will begin next September. Another Shell group company, M.E.K.O.G., will be one of the first companies, if not the first, to manufacture nitrogen fertilizers with a process based on crude oil. The new plant at Velsen-Ymuiden will cost about $9,000,000.

### Caltex Expands; Plans Other Additions

The Netherlands' second refinery is owned by Caltex through Caltex Petroleum Mij. (Nederland). Its capacity was raised this year from 35,000 to 37,000 bbl. daily. A 7,000-bbl.-daily Platformer, a 7,000-bbl.-daily naphtha unit, and a 4,000-bbl.-daily diesel unit will be ready in 1957.

Nederlandse Aardolie Mij., owned by Shell and Standard Oil Co. (N.J.), handles all exploration and production in the Netherlands. There are two producing areas. The newer, Rijswijk-Delft region near The Hague in southwest Netherlands is by far the smaller. Early in the year, the Dutch Government granted N.A.M. a 41,000-acre exploitation concession encompassing the area. Schoonebeek field near the German border is the main source of domestic production. Output has risen to about 19,000 bbl. daily, due chiefly to an improved water separation system placed in service last year.

At the present time, the government is studying a grid system which would link three available types of gas supplies: natural, coke oven, and refinery gases. Six

**NETHERLANDS PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Andel | 1953 | | 3,900-4,700 | | 2 | | | 38 | 5,057 | 38.0 | Jur. ss. |
| Berkel | 1954 | | 3,600 | | 2 | | | 57 | 19,293 | 31.9 | Cret. sd. |
| Delft | 1954 | | 3,800 | | 1 | | | 49 | 38,256 | 30.6 | Cret. sd. |
| Rijswijk | 1953 | | 5,100 | 4 | 1 | | | 847 | 184,021 | 31.7 | Cret. sd. |
| Schoonebeck | 1943 | | 2,500 | | 268 | | | 18,465 | 40,079,806 | 25.1 | Cret. sd. |
| Total Netherlands | | | | 4 | 276 | | | 19,456 | 40,326,433 | | |

**NETHERLANDS REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Caltex Petroleum Maatschappij (Nederland) N.V., Plesmanweg 5, The Hague—Pernis | 37,000 | | 15,500 | [1]R-7,000, [1]Hydro-11,000 P-950 |
| N.V. de Bataafsche Petroleum Mij., The Hague—Pernis | 200,000 | 33,000 | 29,200 | |
| Total Netherlands | 237,000 | 33,000 | 44,700 | |

(1) To be completed in 1957.

small fields near Schoonebeek supply about 14,500 M.c.f. daily to the government which resells it to municipalities. B.P.M.'s refinery supplies about 30,000 M.c.f. daily to towns in southern Holland. Talks have been under way on the possibility of putting to similar use gases from the Caltex refinery.

The Hague is the headquarters for the Royal Dutch Petroleum Co., which holds 60 per cent interest in the Royal Dutch-Shell group. Research laboratories of the group are located at Delft and Amsterdam. The Hague also is headquarters for Aramco Overseas Co., service company of Arabian American Oil Co.

## Portugal . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 35,466 | Capital | Lisbon |
| Population | 6,620,000 | Refining cap., B/D | 25,400 |
| Currency | Escudo | Value | $0.0350 |

THE exploration program which has gone on in central Portugal for several years was placed under the direction of Socony Mobil Oil Co. this year. Under the terms of an agreement signed in Lisbon, the company will direct exploration as a contractor, with an interest in a concession held by Cia. dos Pertoleos de Portugal. The latter company is chiefly owned and financed by the Portuguese Government and the Axel Johnson interests, Stockholm, Sweden. Socony Mobil conducts the program through a new subsidiary, Socony-Vacuum Exploration Co. The most hopeful sign thus far in Portugal's oil search was a show of gas and crude in 1953, in a test well 25 miles north of Lisbon.

### Facilities of S.A.C.O.R.

Seventy-nine-octane gasoline went on sale at mid-year from the enlarged refinery of S.A. Concessionaria de Refinacao de Petroleos em Portugal (S.A.C.O.R.). Large-scale operations at the plant were resumed in 1954 after a curtailment in 1953 because of construction. The 25,400-bbl.-daily plant has catalytic cracking, polymerization, and gas-recovery units. The refinery also produces asphalt and sulfur-based chemicals. S.A.C.O.R., in which the government holds about a one-third interest, has the right to supply up to 50 per cent of the country's inland demand. At the time the company agreed to enlarge and modernize the refinery, S.A.C.O.R.'s license was extended to 1976.

## Spain . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 195,504 | Currency | Peseta |
| Population | 28,100,000 | Value | $0.02353 |
| Capital | Madrid | Refining cap., B/D | 85,700 |

GENERAL improvement in Spain's economy, due to increased rainfall, a booming tourist trade, and American economic and military aid, was reflected in increased demand for petroleum products this year. Estimated consumption, including bunker fuel, is now around 60,000 bbl. daily, up about 18 per cent over 1954. The rise in demand, however, continued to impose problems on the Spanish marketing monopoly, Cia. Arrendataria del Monopolio de Petroleos, S. A. (C.A.M.P.S.A.), which has inadequate storage and transportation facilities and a lack of capital to develop them. Fuel oil is by far the most important product. This year, it will account for more than half of Spain's consumption. By 1960, it is expected to compose more than 70 per cent of total demand. The biggest reason behind this growing importance is the construction of thermal power stations.

An expansion program at the 45,000-bbl. daily Escombreras refinery near Cartagena is expected to be completed next year. The refinery is operated by R.E.P.E.S.A., owned 52 per cent by the government's Instituto Nacional de Industrial (I.N.I.), 24 per cent by the state exploration company, Cia. de Investigacion y Explotaciones Petroliferas (C.I.E.P.S.A.), and 24 per cent by Caltex. Heretofore, Caltex supplied all crude refined at Escombreras. But beginning this year, Shell has had the right to supply up to 25 per cent of the crude because of the need for Spain to pay for oil in sterling.

Spain's second largest refinery, the 40,000-bbl.-daily plant in Tenerife, Canary Islands, operated by Cia. Espanola de Petroleos, S. A. (C.E.P.S.A.) was enlarged in 1955 with the completion of a 4,300-bbl.-daily Platforming unit and a Udex plant. In April, the refinery began to supply 3,300 bbl. daily of 80-86-octane gasoline to C.A.M.P.S.A. A further addition to the refinery will be the installation of a bulk L.P.G. storage and distribution plant. Preliminary plans also have been made to form a firm for the manufacture of ammonia fertilizers from refinery gases and liquid products. C.E.P.S.A. would be the principal owner.

A military pipeline system running diagonally across most of the Spanish peninsula will be an important feature

**PORTUGAL REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| SACOR, S.A., Rua do Alecrim 57, Lisbon—Cabo Ruivo | 25,400 | 10,000 | | |

**SPAIN REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Cia. Arrendataria del Monopolio de Petroleos, S.A., Madrid—Hospitalet | 700 | | | |
| Cia. Espanola de Petroleos, S.A., Madrid—Santa Cruz de Tenerife, Canary Islands | 40,000 | | 3,500 | R-5,000, L-500, A-2,000, V-3,000 |
| Refineria de Petroleos de Escombreras, S.A., Apartado 581, Madrid—Escombreras | [1]45,000 | | 8,200 | [2]R-10,000, P-450, [3]L-27,000 |
| Total Spain | 85,700 | | 11,700 | |

(1) 15,000 bbl. additional to be completed in 1956. (2) To be added in 1957. (3) Tons yearly.

in the $300,000,000 system of air and naval bases being built under a Spanish-United States agreement. The 485-mile line will feed aviation gasoline and other products to five air bases. It will run from Rota, on the southeast coast a few miles from where Columbus set sail, northwest to Zaragoza. Construction contracts were awarded to two American and a Spanish firm: Merritt-Chapman & Scott Corp., New York; Benson & Montin, Oklahoma City; and Agroman Empresa Construction, Madrid. Bids have been asked for construction of underground storage tanks and distribution systems. A British firm, Stewart & Lloyd, already have shipped 38,000 tons of 8, 10, and 12-in. pipe for the line. Prime contractors on the job are Brown-Raymond-Walsh. The project was to be completed in 425 days, or by mid-1956.

Oil exploration was continued on a small scale. Two separate groups had programs. In general, difficult terms and restrictions imposed by the government have made foreign investments in exploration unattractive. V.A.L.D.E.B.R.O., under the wing of I.N.I., cut back on its drilling operations and brought in geophysical equipment in order to make thorough survey of its concession area. Several American companies hold acreage through participation in V.A.L.D.E.B.R.O., including General American Oil Co. of Texas, De Golyer & McNaughton, Delhi Oil Corp., Caltex, and private individuals. The other oil search in Spain is being carried on by C.I.E.P.S.A., in partnership with a German company, C. Deilmann Bergbau. Late this year, C.I.E.P.S.A. was awaiting a heavier rig at a drill site in Navarra, where a show of gas had been found.

# Russia and Eastern Europe . . .

OIL-INDUSTRY operations in Russia and its Eastern European satellites continue to be veiled in secrecy. Official information is revealed from time to time on over-all accomplishments, but western observers generally view specific claims with a grain of doubt.

Two general facts seem clear, however. One is that the Soviets are intensely concerned with developing crude production in all Iron Curtain countries. Secondly, firm progress is being made, even though detailed results and costs in terms of efficiency or wasted resources are unknown.

Russian and Romanian oil has a direct, although minor, connection with the western oil picture through exports. The volume of crude and product shipments rose to around 90,000 bbl. daily last year, placing petroleum ahead of grain as the top export commodity of the Soviets. About two-thirds of this crude was shipped during the last half of 1954. Assuming that exports continued at that pace, or increased, 1955 shipments have averaged around 120,000 bbl. daily.

These shipments had comparatively little effect on over-all free world oil movements. They nettled regular western suppliers here and there. But there were neither enough Red supplies nor were communists willing to sell too much below world prices to be a disturbing influence. The chief significance of Soviet activity in the export market is that the crude can be spared from military stockpiles and civilian use. About three-quarters of the exports to free-world customers went to Europe. Biggest customers were Finland, France, and Argentina. Other buyers included West Germany, Egypt, Israel, Turkey, and India. Reds supply most of the oil consumed in Finland and Iceland.

Due to a lack of marketing outlets and because of internal Soviet conditions, a sharp, continued rise of Iron Curtain exports to free world areas appears unlikely. Except in the case of Finland and Iceland, buyers of Red oil have been small refiners not committed to a crude source, small bulk importers who find the deals advantageous in certain countries, and countries where the government has a voice in refining. Much of the trading is on a barter basis, with provisions for adjustments if either party fails to fulfill its part of the bargain.

Several factors within the Soviet area could put a damper on export increases. The renewed emphasis on heavy industrial buildup could absorb extra petroleum output. Production from the old Baku area, one of the world's oldest producing regions and the source for Russia's exports, has shown signs of leveling off at below pre-war output. If expenses entailed with exporting oil rise beyond the costs of other products, barter with petroleum might again give way to other commodities. These costs are subject to rise if oil from the interior must be exported long distances to seaboard, or if the search for Baku oil continues to go farther offshore in the Caspian Sea.

**Russia . . .** The Soviets have announced that the 1955 crude production goal of 70,000,000 tons will be met. This is an average of about 1,400,000 bbl. daily.

The claim has special significance because this is the final year of the fifth 5-year plan, the final target period for long-range planning. Taken at its face value, the production report indicates that Soviet output has risen 22 per cent over last year, and 85 per cent over 1950, the final year of the preceding 5-year plan.

Most of the production advances have resulted from scattered discoveries and field developments in the Volga-Ural region of East-Central Russia. Called the Second Baku, this region was expected by Pravda to produce more than 60 per cent of the 1955 Russian total, over 840,000 bbl. daily. Another comparatively new source of crude is offshore production in the Caspian Sea, an extension of the old Baku area.

There are indications that increased Russian crude output has been made at the expense of established production. Available manpower and equipment are apparently used to achieve maximum production in the shortest possible time while work lags in older fields. In past years, Pravda has complained of this condition. As an example, Izvestia reported that there is a practice of stopping a well test after the first failure. It said that in Azerbaidzhan as a whole, which includes Baku, there were over 400 untested wells.

### Refining Capacity Adequate

Refining capacity is adequate for present needs. The government follows the policy of diversifying new plants for military reasons, and placing them near consumption centers. The latest plant to go on stream was at Omsk, Siberia, in September. The capacity was not announced. Many of the refineries are outdated by western standards. Izvestia commented this year that many scientific advances made in laboratories are not worked out to the point where the refining industry can adapt them.

There is growing use of natural gas. A 750-mile, 28-in. pipeline now under construction will carry natural gas from Stavropol in the northern foothills of the Caucasus Mountains to Moscow. It is the largest diameter line to be built in Russia. A line from Tallin, Estonia, supplies gas made from shale to Leningrad.

Pipeline construction is now ranked as a high-priority

operation by the government. This stems from crude and product transportation troubles which are a major industry headache in Russia. At present, railroads carry more than half of oil shipments. Barges are used extensively. But frozen rivers tie up traffic during winter months. Poor transportation facilities in some cases have restricted civilian consumption rather than a lack of oil. In one instance this year, the Red press openly blamed transportation tie-ups when a group of collective farms received only one-third of their allotted diesel oil in time for spring planting.

The over-all expansion plans for the Russian oil industry fit into the general scheme to develop several self-sustaining areas. The purpose is to develop regions which could function independently in case of war, and also to solve ever-present transportation problems. To this end, Sakhalin Island oil has made the Far Eastern Military District self-sufficient for oil supplies. Oil in the Arctic is being developed for the same reasons.

N. K. Baibakov, former Minister of the Oil Industry, has been named chairman of the State Commission for Prospective Planning. With a new 5-year plan coming up, the appointment may mean that the oil industry will have an increasingly important role.

**Romania** . . . Communist-controlled Romania has announced that crude production this year would reach 10,500,000 tons, or about 212,000 bbl. daily.

This figure is 500,000 tons short of the target for 1955. But it is considerably above what western observers estimate is probable on the basis of known facts of field and drilling conditions, and on depletion of resources in the country. On the other hand, the official Romanian news agency says nearly three-quarters of Romanian output comes from areas developed after 1948. These are said to be in Moldavia, Altenia, and at Pitesti.

Before the war, Romania had a prospering oil business. Production in the peak year of 1936 averaged 172,000 bbl. daily. Several international oil companies participated in the industry. In 1948, company property was expropriated and the entire industry was put under the direction of the Soviet-controlled Sovrompetrol company. At the time of expropriation, many of the leading producing areas were in a state of decline.

The communists say that refineries destroyed in the Ploesti region during the war have been rebuilt. Estimates place present capacity at around 135,000-155,000 bbl. daily. The Soviets have reported that two new refineries are scheduled, at Cluj and at Giurgevo, which would have a total capacity of about 19,000 bbl. daily.

A large share of Romanian output is shipped to other satellite nations, to Russia itself, and makes up substantial amount of total Communist exports to the free world.

**Hungary** . . . Most Hungarian production comes from the Maort group of fields in the southwestern part of the country. These were originally developed by European Gas & Electric Co. (Standard Oil Co. (N.J.)) through Magyar-Amerikai Olajipari Rt. (Maort). Production last year was reported to be about 25,000 bbl. daily, and plans called for another increase this year. As in other Communist countries, production figures are viewed with reservations by western experts. But it can be assumed from trade agreements calling for exports of oil to other satellites that Hungary has surplus production and refining capacity.

The Maort discoveries were made before the war on an 8,000,0000-acre concession. In 1948 the company renewed operations. But American officials were arrested, imprisoned, and eventually expelled.

**Albania** . . . Albanian production is controlled by the Russian company, Alsovpetrol. The production target this year is a 5,500-bbl.-daily average, against 4,300 bbl. daily in 1954. The producing fields are believed to be located in Central Albania, especially along the Devoli River near Kucove, a town which has been renamed for Stalin.

Small-scale shipments to other countries began this year. One deal called for shipment of around 170,000 bbl. to Italy, Albania's first oil export to a western country.

**Czechoslovakia** . . . The goal of the Czechoslovak oil industry this year was to boost crude output 7 per cent. Official information indicated 1954 output was around 4,600 bbl. daily, but some observers doubt if actual production exceeded 2,000 bbl. daily. The chief producing area is in the south, near the Zistersdorf region of Austria.

**East Germany** . . . East Germany relies heavily on coal-to-oil synthesis plants for its oil supplies. The Russians own the Fischer-Tropsch plant at Schwarzheide, and have taken over hydrogenation plants at Leuna, Troglitz, and Bohlen. The East German Government has nationalized a refinery at Lutzendorf which operates on Austrian crude.

A major exploration program is under way. There have been reports of minor discoveries but production on an important scale has not been accomplished.

**Poland** . . . Polish crude production was reported to be about 5,200 bbl. daily last year. Output comes from fields in the southeast part of the country. The most important prewar fields, however, were located in areas absorbed by U.S.S.R. Communists say that on a calorific basis, natural-gas output now exceeds crude production. Gas pipelines connect fields in the southeast with central cities, including Warsaw.

**Bulgaria** . . . Small-scale production began this year, making Burgaria second only to Israel as the world's newest oil-producing country. Unofficial reports say output comes from the Rogatshevo area. A refinery of around 7,000 bbl. daily capacity was said to be under construction at Varna.

## Scandinavian Countries . . .

| SWEDEN | | | |
|---|---|---|---|
| Area, sq. miles | 173,426 | Currency | Krona |
| Population | 7,075,000 | Value | $0.1934 |
| Capital | Stockholm | Refining cap., B/D | 35,800 |

THE Scandinavian countries played a welcome role in the international oil industry this year. Growing demand for products in this area absorbed much of the European refinery output which had suplied East-of-Suez markets before the Abadan refinery reopened and new Asian and Australian plants went on stream. Sweden, Norway, and Denmark have the highest per capita consumption rates in Europe. At the same time, economic reasons tend to prevent these countries from trying to become self-sufficient in refining.

Because of scattered markets and existing competitive conditions, demand is best met by products imports. Prospects are good for a continuing rise in demand. The region is characterized by cold climate, lack of indigenous coal or oil supplies, and expanding economies. The annual increase in demand varies from about 10 per cent in Norway to 20 per cent in Sweden. As an example of the promise which 1955 held, the value of oil products the area bought from the United Kingdom during the first

half of the year rose to $49,000,000. In the same period last year, purchases were about $25,000,000.

**Sweden . . .** A trend in all Scandinavian countries toward using increasing proportions of heavy oils was most marked in Sweden this year. Middle and heavy distillates and residual fuels now account for more than 75 per cent of inland consumption. In 1938, it was less than 30 per cent. Demand for fuel oils has resulted largely from rapid postwar growth of Sweden's forestry, steel, and engineering industries.

Sweden also has turned to fuel oils for many uses where coal formerly was burned. This tendency was aggravated by high coal prices and uncertain supplies after the war. On a calorific basis, consumption of fuel oils is now greater than that of coal and coke combined. Poland, which had supplied roughly one-fifth of Sweden's coal needs, raised prices on steam coal sharply this year. This foreshadowed a further shift to oil.

Estimated consumption for all products is now about 130,000 bbl. daily. Per capita consumption of 250 bbl. yearly is by far the greatest in Europe. Although relative demand for gasoline, kerosine, and tractor fuel is falling behind heavy oils in importance, actual volume of consumption is rising. The oil market is keenly competitive.

Sun Oil Co. formed an affiliate, began operations at midyear. Companies already having Swedish subsidiaries were British Petroleum Co., Ltd.; Shell; Esso; Gulf and Caltex, and Socony Mobil. These firms formerly concentrated on lubricating oils. They now have entered the gasoline and other markets. Recently, premium grades of gasoline were introduced. In March, the Swedish Government abolished maximum prices which had formerly applied to all major products except fuel oil.

A. Johnson & Co., which operates two refineries with a capacity totaling 13,800 bbl. daily through A.B. Nynas-Petroleum, is building a 2,600-bbl.-daily refinery at Arendal near Goeteborg. Facilities at the new plant will include atmospheric and vacuum-distillation units, and a blown asphalt unit. Light distillates will be moved to the 12,000-bbl.-daily Nynasham refinery for further processing. The new plant is expected to go on stream this year. Plans for the plant were made several years ago, but building restrictions had delayed construction. Sweden's other refining company, Koppartranz Oljeaktiebolag, is owned by Stora Kopparberg Bergslag A/B, a mining and industrial firm, and Rederi A/B Transatlantic, a shipping firm.

Sweden buys some oil products from Russia. This year's agreement called for delivery of 600,000 tons of products, the amount delivered under an earlier arrangement. Purely Swedish concerns handle all oil imports from Iron Curtain countries.

There is no crude production in Sweden. A small part of Scania Province in the extreme south lies in the same sedimentary basin as the Netherlands, northwestern Germany, and Denmark. The government is drilling a deep test in this area which may go to 8,500 ft. in search of oil or salt. The government-owned Kvantorp shale-oil plant has an output of about 2,000 bbl. daily.

**Norway . . .** The Norwegian tanker fleet exceeded 6,000,000 tons for the first time this year. It ranked third in the tanker trade behind the United States and Britain with 15 per cent of the world fleet total. Norway's inland consumption is about 45,000 bbl. daily, on a per capita basis the second highest rate in Europe, behind Sweden. All Norway's oil needs are met by products imports with the exception of crude for a small lubricating-oil and asphalt plant operated by a subsidiary of Standard Oil Co. (N.J.).

| NORWAY | | | |
|---|---|---|---|
| Area, sq. miles | 121,710 | Currency | Krone |
| Population | 3,310,000 | Value | $0.1405 |
| Capital | Oslo | Refining cap., B/D | 1,800 |

| DENMARK | | | |
|---|---|---|---|
| Area, sq. miles | 16,575 | Currency | Krone |
| Population | 4,303,000 | Value | $0.1455 |
| Capital | Copenhagen | Refining cap., B/D | 985 |

**DENMARK REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Dansk Mineraloliefabrik, Lyneborggade 9, Copenhagen—Copenhagen | 65 | | | L-60, A-5 |
| A/S Kalundborg Olieraffinaderi, 13 Sankt Annae Plads, Copenhagen—Kalvanborg | 850 | | | |
| I. C. Glad Co., A.S., Copenhagen—Copenhagen | 70 | | | |
| Total Denmark | 985 | | | |

**NORWAY REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Norske Esso A/S, Prisengate 5, Oslo—Valloy Pr. Tonsberg | 1,800 | | | L-300, A-900 |

**SWEDEN REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| A.B. Nynas-Petroleum, Nynasham: | | | | |
| Nynasham | 12,000 | | 2,900 | |
| Malmo | 1,800 | | | |
| Koppartranz Oljeaktiebolag, Gothenburg—Skarvik | 22,000 | | 4,500 | R-3,000 |
| Total Sweden | 35,800 | | 7,400 | |

**Denmark** . . . Denmark, like Norway, is supplied almost entirely from products imports. Its forecast consumption for this year is about 49,000 bbl. daily, up about 9 per cent over 1954. On a per capita basis, Danish consumption ranks behind Sweden and Norway in Europe. The exploration program carried on by a subsidiary of Gulf Oil Corp. was given up last year after an expenditure of around $10,000,000.

**Finland** . . . The government has decided to build the country's first refinery. Lummus Co. will build the $17,000,000 refinery, the world's northernmost, near Taku in southwest Finland. The 18,000-bbl.-daily plant will supply most domestic needs. Its construction, however, in light of existing trade agreements between Finland and Russia, seemed to be a threat to the marketing position of western companies operating in Finland.

Until 1952, affiliates of three companies, Standard Oil Co. (N. J.), Royal Dutch-Shell, and Gulf, supplied nearly all of Finland's oil needs. At that time, the government began importing supplies from Russia because of dollar and sterling shortages. To the extent that there was a lack of currency for payments of products from usual sources, western firms agreed to handle Russian products through their distribution facilities. These handled about 80 per cent of the gasoline demand and a good-sized share of other markets. For 2 years, Soviet oil was sold almost exclusively. This year's Russo-Finnish agreement called for shipments of 550,000 tons of products, more than half the country's needs, but less than in previous years. At the same time, Finland agreed to buy more Russian products in the future. For the next 5 years, 1956-60, Russia is to supply about 80 per cent of Finland's needs. This agreement was made with products in mind. If, instead of products, lower-priced crude is delivered to the refinery, an even greater supply of oil would come from Russia.

Meanwhile, Finland had reached an agreement with Romania under which that Iron Curtain country would supply 20 per cent of Finnish products requirements in 1955. Western companies refused to distribute Romanian oil. They argued that Finland now had currency to buy western oil. The firms said they should not be made to use their capital to sell competitor's wares. As a result of protests, the government agreed to permit western companies to import quantities of products from time to time.

## United Kingdom . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 94,279 | Value | $2.80 |
| Population | 50,370,000 | Refining cap., B/D | 597,450 |
| Capital | London | Production, B/D | 1,010 |
| Currency | Pound | Number of fields | 7 |
| | Reserves, bbl. | 5,000,000 | |

THE activities of British oil companies both at home and abroad contribute much to the United Kingdom's status as the world's greatest trading nation and financial hub of the Eastern Hemisphere.

Two major and several smaller oil companies are active in all phases of the oil industry in nearly every part of the world. The two giants, British Petroleum Co., Ltd., (formerly Anglo-Iranian) and Royal Dutch-Shell, which is affiliated with Dutch interests, handle around a third of all crude and products in international trade. Business this year is at a higher level than last, when the two companies had crude production totaling more than 2,100,000 bbl. daily and refinery runs totaling more than 2,200,000 bbl. daily.

Britain itself is the second largest consumer of oil products in the free world, behind the United States. Consumption continued to increase rapidly this year from the record 1954 level. During the first 9 months inland consumption averaged 460,000 bbl. daily, up nearly 11 per cent over the same period last year. Some forecasts place demand for oil by 1980 at six times the 1954 level, or equivalent of 200,000,000 tons of coal.

One of the most noteworthy developments of the year was the announcement by the U. K. Central Electricity Board of its decision to use fuel oil in a number of power stations. Deliveries of heavy fuel oil began this year. By 1960 some 16 power stations will use around 110,000 bbl. daily. Contracts for delivery of the oil were signed with Esso Petroleum Co., Ltd., and Shell-Mex and British Petroleum, marketer in United Kingdom for Shell, Eagle Oil & Shipping Co., Ltd., and British Petroleum.

As in most European countries, demand for fuel oils is outstripping gasoline consumption. The situation presents the refining industry with a growing problem, that of preserving the necessary balance of various products in processing. For this reason, the industry is seeking a reduction in gasoline taxes in hope that the step would spur demand.

The construction of special processing units and petrochemical plants highlighted the refining side of the industry this year. This emphasis followed on the heels of the virtual completion of Britain's over-all refinery construction program in 1954.

### Eight Refineries Account for 600,000 Bbl. Daily

The eight largest refineries account for most of the United Kingdom's total refining capacity of nearly 600,000 bbl. daily. British Petroleum subsidiaries operate three of the major plants: the 100,000-bbl.-daily Kent refinery on the Isle of Grain, the 50,000-bbl. daily Grangemouth, Scotland, plant, and the 65,000-bbl.-daily plant at Llandarcy, Wales. Shell has three large refineries: the 36,000-bbl.-daily Heysham plant, the 66,600-bbl.-daily Shell Haven plant, and the 91,000-bbl.-daily Stanlow plant. Esso Petroleum Co., Ltd., a subsidiary of Standard Oil Co. (N.J.), operates the 150,000-bbl.-daily Fawley refinery. Vacuum Oil Co., Ltd., in which Socony Mobil Oil Co. has 50 per cent interest, has a 21,000-bbl.-daily refinery at Coryton.

Specific additions of processing units this year included a 6,000-bbl.-daily Platformer at the Llandarcy refinery. British Petroleum has a similar unit on stream at its Kent refinery. Late this year, British Petroleum said it planned to add alkylation facilities designed to produce 2,600 bbl. daily of aviation gasoline at Kent. The $18,200,000 unit is expected to be in operation by 1958. Esso Petroleum has announced plans for a Hydrofiner at Fawley. Esso also has revealed plans for a $2,800,000 expansion of its research laboratories near Abingdon. The project will be completed by the end of 1957.

British Petroleum and Shell are especially active in the petrochemical field, where there is a growing market for such products as solvents, plastics, fibers, and synthetic detergents. A number of plants are going up around Grangemouth refinery. British Petroleum Chemicals, Ltd., jointly owned by British Petroleum and Distillers Co., Ltd., which already produces synthetic ethyl alcohol at Grangemouth, has a $22,500,000 expansion program under way which will be completed in mid-1957. Stone & Webster Engineering Corp. will build ethylene, ethanol, and tetramer units. Kellogg International Corp. will put up a butadiene plant. British Petroleum Chemicals and Oronite Chemical Co. (Standard Oil Co. of California) also have an arrangement for the production of detergent alkylates. Forth Chemicals, Ltd., two-thirds owned by

British Petroleum Chemicals and one-third by Monsanto Chemicals, Ltd., produces monomeric styrene in the area. Union Carbide is building a polyethylene plastic plant which is expected to go into production the third quarter of 1957. British Petroleum Chemicals will supply ethylene for the plant.

Shell this year formed a new company, Shell Chemical Co., Ltd., to handle its chemical manufacturing and marketing in the United Kingdom. The firm took over the activities of Shell Chemical Manufacturing Co., Ltd., and Shell Chemicals, Ltd. A $2,000,000 epoxide plant at Stanlow refinery went into operation in September. The plant will manufacture 2,000 tons a year of seven different grades of epoxide. A new plant at Shell Haven will produce ammonia for making nitrogenous fertilizers. Shell's Partington petrochemical plant, near Manchester, has an intake capacity of up to 2,000 bbl. daily of distillate.

Imperial Chemical Industries, Ltd., is another important company in the petrochemical field. A large proportion of its $600,000,000 postwar expansion program was devoted to development of its facilities at Wilton, where basic chemicals are made by cracking of petroleum naphtha from the Middle East. The company also produces gasoline by hydrogenation of tar oils at a plant at Billingham.

Another important development this year was an arrangement under which British Petroleum's Kent refinery will furnish gas-oil feed stock for the first large scale British plant to produce gas from oil. British Petroleum signed a 20-year contract with the South Eastern Gas

## UNITED KINGDOM PRODUCTION

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Caunton | 1943 | 60 | 2,000-2,200 | | 10 | | | 30 | 209,000 | 23.3 | Keuper Waterstone |
| Duke's Wood | 1941 | 400 | 1,800-2,500 | | 110 | | | 467 | 2,999,000 | 33.4 | Millstone ss. |
| Eakring | 1939 | 200 | 1,800-2,500 | | 45 | | | 155 | 1,788,000 | 33.4 | Millstone ss. |
| Egmanton | 1955 | | | | | | 1 | | | | Millstone ss. |
| Formby | 1939 | 20 | 85-130 | | 10 | | | 3 | 69,000 | 33.4 | Millstone ss. |
| Kelham Hills | 1941 | 350 | 2,000-2,200 | | 41 | | | 330 | 1,480,000 | 23.3 | Millstone ss. |
| Plungar | 1953 | | 2,900 | | 3 | | 2 | 25 | 12,000 | 20.5 | Millstone ss. |
| Total United Kingdom | | | | | 219 | | 3 | 1,010 | 6,557,000 | | |

## UNITED KINGDOM REFINING

### England

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Manchester Oil Refinery, Ltd., Twining Road, Trafford Park, Manchester 17: | | | | |
| Manchester | 3,500 | | | L-1,750, V-2,500 |
| North Rochester | 1,250 | | | |
| Berry, Wiggins & Co., Ltd., Field House Breams Building, Fetter Lane, London E.C. 4—Weaste | 2,200 | | | |
| Esso Petroleum Co., Ltd., 36 Queen Anne's Gate, London S.W. 1—Fawley | 150,000 | 40,000 | 3,750 | V-60,000, L-2,250, [1]Hydro-14,000, A-2,600 [1]R-15,000 |
| Kent Oil Refinery, Ltd., Britannic House, Finsbury Circus, London, E.C. 2—Isle of Grain, Kent | 100,000 | 12,500 | | V-34,000, R-6,000, L-2,600, [2]Hydro-10,000 |
| Lobitos Oilfields, Ltd., 146 Dashwood House, Old Broad Street, London E.C. 2—Ellesmere Port | 4,200 | | 800 | V-1,100, A-150, L-650 |
| Shell Refining & Marketing Co., Ltd., Houndsditch, London, E. 1—Heysham | 36,000 | | 10,200 | |
| Shell Refining & Marketing Co., Ltd., and Starhaven Refineries Ltd., Houndsditch, London, E. 1: | | | | |
| Ardrossan | 3,200 | | | |
| Shell Haven | 66,600 | | 9,200 | |
| Stanlow | 91,000 | 28,000 | 9,200 | R-9,200, Hydro-5,000 |
| Vacuum Oil Co., Ltd., Caxton House, Tothill Station, London, S.W. 1—Coryton | 21,000 | 15,000 | 2,500 | V-10,000, L-2,000 |
| Total England | 478,950 | 95,500 | 35,650 | |

(1) Planned. (2) Scheduled for 1957.

### Scotland

| | | | | |
|---|---|---|---|---|
| Grangemouth Petroleum Refinery, Ltd., Britannic House, Finsbury Circus, London E.C. 2—Grangemouth | 50,000 | 12,500 | | V-17,000 P-2,200, Hydro-500 |
| Scottish Oils, Ltd., 53 Bothwell Street, Glasgow, C. 2, Scotland—Pumpherston | 3,500 | | 2,800 | Ck-15 |
| Total Scotland | 53,500 | 12,500 | 2,800 | |

### Wales

| | | | | |
|---|---|---|---|---|
| National Oil Refineries, Ltd., Britannic House, London—Llandarcy | 65,000 | 12,500 | | V-25,000, R-6,000, Hydro-3,500, L-2,000, A-500 |
| Total United Kingdom | 597,450 | 120,500 | 38,450 | |

Board for the supply of from 1,200 to 1,400 bbl. of gas oils daily which will produce from 15,000 to 20,000 M.c.f. daily. The gas board will build the plant, which eventually may be expanded to a capacity of 80,000 M.c.f. daily. The oil-to-gas plant will be located near the refinery about 40 miles from London. In talks between the Southern Gas Board and Esso Petroleum there was an agreement "in principle" on the sale of tail gas from Fawley refinery for domestic use in the Portsmouth and Southampton area. It was estimated that the gas, which is normally flared, could fill about 10 per cent of the board's needs.

The expanded refinery capacity in Britain enabled the United Kingdom to become a net exporter of petroleum products in 1953 and 1954. British sources doubted that this would be true this year, due to the sharp rise in home demand and the loss of markets to new refineries especially east of Suez. During the first 8 months, product imports averaged 172,000 bbl. daily, against exports of about 122,000 bbl. daily. At the same time last year, exports led imports by 160,000 bbl. daily, compared with 144,000 bbl. daily. There was a considerable realignment of export markets this year. A drop in product sales to countries east of Suez, and to an extent other European countries building their own refineries, has in part been made up by rising demand in other areas, especially Scandinavia.

At midyear, tankers flying the British flag totaled 7,283,354 tons, according to John I. Jacobs & Co., Ltd., London. There were 531 ships in the fleet, which accounted for 18.2 per cent of the world total and ran a close second to the United States in total tonnage. British Petroleum, Shell, and Esso Petroleum all placed large orders in world shipyards this year. British Petroleum placed orders in October for 23 new tankers totaling 836,000 tons. Shell has ordered 17 new tankers in the 32,000-ton class and the same number in the 18,000-ton class. Esso Petroleum has placed orders for six 36,000-ton vessels.

Exploration and production in the United Kingdom is carried on by a British Petroleum subsidiary, D'Arcy Exploration Co. Since work began in 1936, the company has sunk more than 500 wells and has drilled over 1,000,000 ft. At midyear, there were 219 pumping wells producing slightly over 1,000 bbl. daily. The three main producing fields, Eakring, Duke's Wood, and Kelham Hills, are located in the Midlands, near Nottingham. The first commercial discovery was made at Eakring in 1939, and refraction survey parties working south and east established the domes at Duke's Wood and Kelham Hills. The latest field discovery is at Plungar, about 20 miles from Eakring. Of eight wells drilled in the area since its discovery in 1953, three are producers.

The year may be a record one for British manufacturers of oil equipment and materials. During the first 6 months, orders were placed for more than $175,000,000 worth of supplies, up about 61 per cent, or more than $65,000,000 over the sales level during the first half of 1954. The United Kingdom's refinery expansion program originally gave impetus to the equipment manufacturing, which ranks second to the United States industry. The peak year for business, so far, was in 1952 when orders totaled $252,000,000. Sales slackened by around 25 per cent during 1953, but began picking up again last year.

## West Germany . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **94,273** | **Value** | **$0.2375** |
| **Population** | **48,200,000** | **Refining cap., B/D** | **272,270** |
| **Capital** | **Bonn** | **Production, B/D** | **62,437** |
| **Currency** | **Deutsche Mark** | **Producing fields** | **70** |
| | **Reserves, bbl.** | **495,000,000** | |

THE West German oil industry expanded on all fronts this year: exploration, production, and refining. Crude output from 67 fields averaged 60,000 bbl. daily during the first 9 months, against the entire 1954 average of 51,700 bbl. daily. A further rise in the production curve was foreshadowed by new discoveries which were made at about the same rate as in previous years. During the first 10 months, seven new oil fields and three natural-gas deposits were discovered in the Cretaceous and Jurassic of Northwest Germany and the Tertiary of South Ger-

**GERMANY PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bavaria** | | | | | | | | | | | |
| Ampfing | 1954 | | 5,900 | 2 | | | 1 | 215 | 20,626 | 20.0 | Tert. sd. |
| Heimertingen | 1954 | | 5,100 | | 1 | | 2 | 10 | | 33-37.0 | Olig. Tert. sd. |
| Isen | 1954 | | 6,500 | | 1 | | | 10 | 2,989 | 18.0 | Tert. sd. |
| Total Bavaria | | | | 2 | 2 | | 3 | 235 | 23,615 | | |
| **Emsland District** | | | | | | | | | | | |
| Adorf | 1946 | 120 | 4,000-4,400 | | | | | | 47,739 | 30.0 | L. Cret. shell |
| Emlichheim | 1944 | 950 | 2,400-2,900 | | 89 | | 2 | 3,060 | 7,540,434 | 25.0 | L. Cret. sd. |
| Georgesdorf | 1944 | 1,650 | 1,600-3,300 | 83 | 79 | | 2 | 5,060 | 9,451,264 | 24-29 | L. Cret. ss. |
| Lingen | 1942 | | 2,300-2,900 | 6 | 206 | | 3 | 2,350 | 6,055,370 | 30-32 | L. Cret., Jur. sd., L. ls. |
| Ruhlermoor | 1949 | 4,700 | 2,000-2,800 | 44 | 92 | | 2 | 6,670 | 6,566,023 | 25.0 | L. Cret. sd. |
| Ruhlertwist | 1949 | 1,500 | 2,300-2,950 | | 86 | | 2 | 2,860 | 3,986,735 | 25.0 | L. Cret. sd. |
| Scheerhorn | 1949 | | 2,500-3,700 | 16 | 44 | | 2 | 2,190 | 2,312,868 | 30.0 | L. Cret. sd. |
| Total Emsland | | | | 149 | 596 | | 13 | 22,190 | 35,960,433 | | |
| **Hamburg District** | | | | | | | | | | | |
| Hohenhorn | 1954 | | 7,900 | | | | 1 | | 2,357 | | Liassic |
| Reitbrook | 1937 | 1,160 | 1,400-2,600 | 67 | 65 | | | 1,185 | 10,556,429 | 21-22 | L. Eoc. sd., U. Cret. ls. |
| Total Hamburg | | | | 67 | 65 | | 1 | 1,185 | 10,558,786 | | |

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hanover District** | | | | | | | | | | | |
| Broistedt | 1937 | 160 | 2,400-3,200 | | 7 | | | 60 | 400,035 | 35.0 | L. Cret. sd. |
| Calberlah | 1945 | 1 | 160-400 | | 8 | | | 10 | 50,403 | 22.0 | Jur. ss. |
| Eddesse-Nord | 1950 | 50 | 500-1,170 | | | | | | | 26-34 | Tri., Lia., L. Cret. ss. |
| Eddesse-Olheim | 1876 | 50 | 2,900-3,300 | 3 | 61 | | | 1,028 | 2,638,601 | 32.0 | Tri. ss. |
| Ehra | 1939 | 22 | 400-820 | | | | | | 85,399 | 16.0 | Jur. ss. |
| Eicklingen-Wienhausen | 1937 | 50 | 1,600-3,100 | | 17 | | | 225 | 2,159,238 | 32-33 | L. Cret. ss. |
| Eilte | 1947 | 5 | 3,500-3,700 | | 1 | | | 1 | 13,746 | 23.0 | L. Cret. sd. |
| Eldingen | 1949 | 500 | 4,900-5,300 | 15 | 32 | | 1 | 1,875 | 2,853,341 | 35.0 | Jur. sd. |
| Fuhrberg-Hambuehren | 1939 | 2,950 | 2,600-2,170 | | 248 | | | 735 | 4,879,802 | 22-23 | Jur. ss. |
| Gifhorn | 1935 | 40 | 650-1,000 | | 39 | | | 33 | 367,595 | 16.0 | L. Cret. sd. |
| Hademstorf | 1941 | 115 | 4,100-4,500 | | 11 | | | 140 | 717,895 | 25-29 | Jur. ls., L. Cret. sd. |
| Hankensbuettel | 1954 | 620 | 5,000-5,300 | 19 | 4 | | 4 | 3,375 | 941,559 | 33.0 | Jur. sd. |
| Hohenassel | 1943 | 60 | 1,400-2,100 | | 43 | | | 460 | 1,947,445 | 31.0 | Jur. ls. |
| Hohne | 1951 | 620 | 4,400-6,500 | 27 | 10 | | 1 | 3,370 | 3,683,459 | 33-34 | Jur., Tri. ss. |
| Kronsberg-Pattensen | 1953 | | 2,000 | 4 | 9 | | | 205 | 78,221 | 27.0 | Jur. ss. |
| Lehrte | 1952 | 200 | 3,600-4,000 | | 10 | | 1 | 420 | 299,194 | 31.0 | Jur. ss. |
| Meckelfeld | 1938 | | 1,000-8,600 | | 22 | | 1 | 30 | 427,619 | 24-32 | Cret., Lia ss., ls. |
| Meerdorf | 1954 | | 5,570 | | | | 1 | | 2,776 | 42 | Jur. ss. |
| Moelme | 1935 | 100 | 1,600-1,800 | | 5 | | | 43 | 1,086,499 | 32 | Cret., Jur. ss., ls. |
| Nienhagen | 1899 | 4,600 | 600-5,350 | | 218 | | | 1,270 | 34,092,872 | 22-32 | L. Cret., Jur. ss., ls. |
| Nienhagen-Haenigsen | 1940 | 120 | 2,200-2,770 | | | | | 180 | 3,711,489 | 24-28 | L. Cret. sd., |
| Oberg | 1918 | 560 | 500-1,900 | | 52 | | | 105 | 2,602,377 | 36-46 | L. Cret., Jur. |
| Oerrel-Sued | 1954 | | 4,400-4,560 | 7 | 1 | | 1 | 420 | 60,066 | | Jur. sd. |
| Ruehme | 1954 | | 2,200-2,300 | 6 | 6 | | 1 | 390 | 71,895 | | Jur. |
| Steimbke | 1936 | 420 | 790-3,700 | | 207 | | 1 | 1,140 | 6,660,134 | 18 | Cret., Jur. |
| Suderbruch | 1949 | 2,530 | 3,800-7,650 | | 71 | | | 3,180 | 4,948,601 | 25-37 | Cret., Jur. ss., ls. |
| Thoeren | 1941 | 110 | 1,500-4,100 | | 53 | | | 340 | 1,735,609 | 19-38 | L. Cret. Jur. |
| Vechelde | 1954 | | 6,000 | | 1 | | | 45 | 7,533 | 31 | Tri. ss. |
| Vorhop | 1952 | | 3,200-5,200 | 4 | 2 | | 3 | 530 | 184,543 | 36 | Jur. sd., ss. |
| Wathlingen | 1950 | 27 | 2,000 | (Included in Nienhagen fig.) | | | | 180 | 325,847 | 27 | Cret ss. |
| Wesendorf | 1943 | 1,200 | 1,200-6,300 | 7 | 73 | | 2 | 1,510 | 5,228,170 | 17-42 | Cret., Jur. |
| Wietze | 1879 | 60 | 300-1,000 | | 89 | | | 505 | 17,933,663 | 16-29 | Cret., Jur. |
| Total Hanover | | | | 92 | 1,300 | | 17 | 21,805 | 100,195,626 | | |
| **Schleswig-Holstein District** | | | | | | | | | | | |
| Boostedt | 1952 | | 5,500-6,300 | 14 | 9 | | 2 | 2,330 | 1,190,359 | 29-31 | Jur. sd. |
| Bramstedt | 1954 | | 6,200-6,530 | 4 | | | 2 | 855 | 144,158 | 34-35 | Jur. ss. |
| Heide | 1935 | 900 | 2,600-5,900 | 8 | 65 | | 2 | 1,520 | 11,860,522 | 21-32 | Cret., Jur. |
| Kiel | 1955 | | 5,800 | 2 | | | 1 | 80 | 3,039 | 32 | Jur. ss. |
| Ploen | 1952 | 200 | 6,500 | 11 | 2 | | 3 | 1,180 | 710,675 | 34 | Jur. ss. |
| Total Schleswig-Holstein | | | | 39 | 76 | | 10 | 5,955 | 13,908,753 | | |
| **Upper Rhine Valley District** | | | | | | | | | | | |
| Dudenhofen | 1955 | | 6,500 | | 1 | | 1 | 13 | | | Olig. sd. |
| Forst-Weiher | 1934 | 230 | 1,200-2,600 | | 41 | | | 37 | 638,837 | 32-34 | Tri., Jur., Tert. ss. |
| Landau | 1955 | | 4,800 | | | | 1 | | | 36 | Olig. ss. |
| Rot | 1953 | | 2,100-2,500 | | 11 | | | 200 | 197,075 | 25-26 | Tri. sandy clay with fissure |
| Stockstadt | 1952 | 350 | 1,600 | | 15 | | | 1,350 | 704,646 | 39 | Olig. ss. |
| Wattenheim | 1954 | | 7,500 | | 1 | | 5 | 30 | 12,219 | | Olig. sd. |
| Weingarten | 1936 | | 800-3,600 | | 82 | | 1 | 70 | 406,603 | 32-36 | Olig., Tri. sd., ss. |
| Total Upper Rhine Valley | | | | | 151 | | 8 | 1,700 | 1,959,380 | | |
| **Weser-Ems District** | | | | | | | | | | | |
| Aldorf | 1952 | | 3,600 | 1 | 38 | | 4 | 1,950 | 1,312,335 | 32 | Jur. ss. |
| Barenburg | 1953 | 700 | 2,300-2,550 | 13 | | | 1 | 1,370 | 380,659 | 29 | L. Cret. sd. |
| Bockstedt | 1954 | | 3,900 | | 6 | | | 320 | 96,539 | | L. Cret. sd. |
| Dickel | 1953 | | 4,600 | | | | | | 2,421 | | Jur. |
| Dueste-Wietingsmoor | 1954 | | 2,800 | 13 | 5 | | 6 | 1,440 | 171,863 | | L. Cret. sd. |
| Etzel | 1942 | 15 | 4,700 | | 5 | | | 62 | 325,883 | 13 | Jur. lime breccia |
| Garen | 1953 | | 3,200-4,400 | | | | | 30 | 4,210 | 28 | L. Cret., Jur. |
| Hemmelte-West | 1951 | 1,600 | 3,700-4,500 | 23 | 14 | | 1 | 2,500 | 2,410,280 | 32 | Jur. ls., ss. |
| Liener | 1953 | | 2,600-4,500 | | 5 | | 1 | 120 | 59,150 | 31 | Jur. ss. |
| Molbergen | 1953 | | 2,400 | | 13 | | 2 | 290 | 169,683 | 26 | Jur. ls. |
| Ostenwalde | 1953 | | 4,200-4,960 | | 4 | | 1 | 61 | 24,211 | | Cret., Jur. |
| Quakenbruck | 1950 | 120 | 1,200-1,950 | | 8 | | | 54 | 253,108 | 35 | Cret., Jur. ls. |
| Vestrup | 1955 | | 6,200 | | | | 1 | | | 39 | Jur. |
| Voigtei | 1953 | | 1,500-1,700 | 14 | 7 | | 2 | 1,170 | 445,937 | 31-34 | Jur. |
| Total Weser-Ems | | | | 64 | 105 | | 19 | 9,367 | 5,656,279 | | |
| Total Germany | | | | 413 | 2,295 | | 71 | 62,437 | 168,262,872 | | |

many. Some of these fields, including Landau field, located at the Upper Rhine, and Lueben field, northeast of Celle, are rather promising.

About 40 per cent of the total footage drilled is in exploration wells, either wildcats or extensions. From January through September, about 125 rigs drilled 1,863,959 ft., compared with last year's total footage of 2,158,056 ft.

The republic's rapidly growing demand for petroleum products was reflected in refinery output. During the first 9 months, this output averaged 194,000 bbl. daily, compared with an average of 167,000 bbl. daily last year. Domestic consumption rose to 193,000 bbl. daily the first half of 1955, against 164,000 bbl. daily during 1954. The refinery output during 1956 is forecast at around 220,000 bbl. daily.

At the beginning of the year, West German refineries had a total capacity of 272,300 bbl. daily, about 10,000 bbl. daily more than at the beginning of 1954. The added capacity was chiefly due to the Standard Oil Co. (N. J.) plant at Hamburg-Harburg, and the British Petroleum Co., Ltd., plant at Hamburg-Finkenwerder.

Other developments in the refining branch of the industry included the completion of a catalytic cracker at the 6,000-bbl.-daily plant of Ruhrchemie A.G. at Oberhausen-Holten. The Belgian Petrofina group acquired 75 per cent ownership in the 6,000-bbl.-daily Ruhrbau GmbH. plant at Muelheim. The group announced a modernization plan for the plant, which had been shut down except for crude topping.

Because of the rapidly expanding market for products, the major oil companies, British Petroleum, Shell, and Jersey Standard, have developed plans for possible further expansion of refining facilities. Jersey Standard is considering the erection of a new 60,000-bbl.-daily plant in the neighborhood of Cologne on the Rhine River. Shell will expand the crude capacity of its 19,000-bbl.-daily Hamburg-Harburg plant by around 34,000 bbl. daily.

Exports of finished products last year, mostly to Scandinavia, averaged 12,300 bbl. daily. During the first 9

**GERMANY REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Badische Anilin & Soda-Fabrik AG., Ludwigshafen on Rhine—Ludwigshafen-Oppau | 1,000 | | | L-200 |
| BP Benzin und Petroleum-GmbH., Hamburg 1, Steinstrasse 5—Hamburg-Finkenwerder | [3]30,000 | | 7,700 | R-5,000 |
| Deutsche Erdoel-AG., Hamburg 13, Mittelweg 180: | | | | |
| Heide | 12,600 | 7,800 | | L-1,600 |
| Wietze | 1,400 | | | |
| Deutsche Gasolin AG., Hannover, Jordanstrasse 32—Dollbergen | [2]2,500 | | | L-800 |
| Deutsche Shell AG., Hamburg 36, Alsterufer 4-5, Shell-Haus: | | | | |
| Hamburg-Harburg | [3]19,500 | | | L-2,000 |
| Monheim | 4,300 | | | L-1,300 |
| Deutsche Vacuum Oel AG., Hamburg 1, Steinstrasse 5—Bremen-Oslebshausen | 15,300 | 7,800 | | L-1,100 |
| Esso AG., Hamburg 36, Neuer Jungfernstieg 21, Esso-Haus—Hamburg-Harburg | [4]46,000 | 11,400 | 3,500 | L-1,500 |
| Gelsenberg Benzin AG., Gelsenkirchen—Gelsenkirchen | 39,000 | 10,000 | | R-6,500, Hydro-15,500 |
| Gewerkschaft Deurag-Nerag, Hannover, Hindenburgstrasse 27-29—Misburg | [2]12,000 | | 6,600 | L-1,600 |
| Gewerkschaft Erdoel-Raffinerie Emsland, Lingen (Ems)—Lingen-Holthausen | [2]12,000 | 18,500 | | |
| Gewerkschaft Greiff Bergbau Mineraloelraffinerie, Dollbergen/Lehrte—Dollbergen | 500 | | | |
| Kraftstoff-Handelsgesellschaft mbH., Essen, Rathenaustrasse 6—Essen-Altenessen | [1]1,700 | | | |
| Mineraloel und Asphaltwerke AG., Hamburg 1, Ballindamm 14-15—Ostermoor on Kiel-Canal | [2]2,100 | | | |
| Mineraloelwerke Albert Sengewald, Dedenhausen ueber Lehrte—Dedenhausen | [1]900 | | | |
| Mineraloelwerke Peine, Peine bei Hannover—Peine | 400 | | | |
| Oelwerke Julius Schindler GmbH., Hamburg 36, Hohe Bleichen 28—Hamburg-Neuhof | 4,300 | | | L-650 |
| Ruhrbau GmbH., Muelheim/Ruhr, Timmerhellstrasse—Muelheim | [6]6,500 | | | |
| Ruhrchemie AG., Oberhausen-Holten—Oberhausen-Holten | 6,000 | 2,100 | | R-1,800 |
| Ruhroel GmbH., Bottrop, Postfach 122—Bottrop-Welheim | 2,500 | | 800 | |
| Scholven-Chemie AG., Gelsenkirchen-Buer, Dorstenerstrasse 227—Gelsenkirchen-Buer | 21,500 | 5,100 | | R-2,100, Hydro-6,500 |
| Union Rheinische Braunkohlen Kraftstoff AG., Wesseling bei Koeln—Wesseling | 28,000 | | 16,700 | Hydro-7,100 |
| Wintershall AG., Kassel, Friedrich Ebert Strasse 160—Salzbergen | 2,100 | | | L-430 |
| Zeller & Gmelin, Eislingen/Fils, Postschliessfach 35—Eislingen | [1]170 | | | |
| | 272,270 | 62,700 | 35,300 | |

(1) Currently not operating (shut down). (2) Erection of a Hydrofiner with a capacity of 6,000 bbl. per day which is scheduled to be put on stream late in 1956. (3) Extension from 19,500 to 56,000 bbl. per day is scheduled. The building program in detail: catalytic cracker with the necessary distillation units, hydrodesulfurizing plant for diesel oil, two Platformers. One U.O.P.-Platformer with a capacity of 2,500 bbl. per day of heavy gasoline is being erected and is to be put on stream early in 1956. (4) A Hydrofiner with a capacity of 8,000 bbl. per day is being built, which is to go into operation still in this year. A refinery with a capacity of 65,000 bbl. per day is intended to be erected near Cologne with modern plants including a cracking plant. (5) A U.O.P.-Platformer with a capacity of 2,500 bbl. per day is being erected. (6) A Houdriformer of 3,000 bbl. per day operated according to the method of Houdry Process Corp. is to go into operation still late in 1955. (7) The present throughput capacity of 4,300 bbl. per day of crude oil is intended to be doubled. (8) After Petrofina had acquired 75 per cent of the Ruhrbau capital, the plant, which was shut down for a rather long time, is to be modernized and perhaps even expanded.

months of 1955, the level rose to 18,300 bbl. daily.

The West German oil industry exists in an expanding, prosperous economy, under favorable governmental laws. Over-all gains this year surpassed the expectations of many West German oil men. On the exploration-production side, the discoveries discounted predictions that the production curve would flatten due to a lack of new reserves. Some experts believe this will happen within a few years because the bulk of the exploration projects in Cretaceous and even Jurassic formations of Northwest Germany have already been tested.

On the refining side, growing demand has offset the prediction that refiners would have to cope with over-expansion. It had been anticipated in some quarters that with the OEEC-Refinery Expansion Program fulfilled, refiners would pause for several years to coordinate production with demand and to consolidate markets.

*(A special article describing the new discoveries and refinery projects may be found in this issue of The Oil and Gas Journal on page 210.)*

## Yugoslavia . . .

THE oil industry of Yugoslavia, a Communist nation aligned with the West rather than Russia, continued to show marked progress this year.

During the first 6 months, crude production rose to an average of about 5,100 bbl. daily, against 3,900 bbl. daily last year. This output resulted largely from an exploration and development program instituted by the Government after the war.

At present, all crude and the country's small natural-gas production comes from Pannonia basin in northern Yugoslavia. This basin also holds the best prospects for the future. So far, 5 to 7 per cent of the area has been explored. Six small fields are in production and four more are being developed. Most of the production lies within the province of Croatia.

Yugoslavia's three refineries, located at Rijeka, Sisak, and Bosanski Brod, have a combined capacity of about 19,000 bbl. daily.

*(A special article on Yugoslavia's oil industry may be found in this issue of The Oil and Gas Journal on page 255.)*

# SOUTHERN AND EASTERN ASIA

## Burma . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **261,789** | **Value** | **$0.2115** |
| **Population** | **18,674,000** | **Production, B/D** | **3,700** |
| **Capital** | **Rangoon** | **Refining cap., B/D** | **3,000** |
| **Currency** | **Kyat** | **Reserves, bbl.** | **45,000,000** |

REBUILDING of the oil industry in Burma is advancing a step further with the current reconstruction program at Syriam refinery, near Rangoon. When reopened, however, the plant will have only a fraction of the 20,000 bbl. daily pre-World War II capacity.

The main units, a 3,500-bbl.-daily distillation unit and a Dubbs cracking plant, together with a 3,000-bbl.-daily topping plant at Chauk field, are designed to furnish products for domestic demand.

The rebuilding job is a project of Burma Oil Co. (1954), Ltd., formed last year when the Burmese Government acquired a one-third share in the British-owned industry. The remaining two-thirds is held chiefly by Burmah Oil Co., Ltd., and by two smaller concerns, Indo-Burma Petroleum Co., Ltd., and British-Burmah Petroleum Co., Ltd.

The aim of the new company is to build production to the 10,000-bbl.-daily level to meet internal demand and to regain a part of the former export market. The country's geological department estimates proved reserves justify 10,000 bbl. daily output for 10 to 15 years, followed by production of around 20,000,000 bbl. at a declining rate. Before the war, Burma produced around 21,000 bbl. daily and ranked fifteenth among world oil producers. The field and refinery facilities were destroyed in the war. Burma gained its independence in 1947. But near-civil war for several years delayed rebuilding of the oil industry. Partial nationalization of the industry took place in January 1954 after several years of negotiation. Under the agreement the Burmese Government has the right to buy as much additional stock if and when it wishes at par value.

**BURMA PRODUCTION**

| Name of field | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chauk-Lanyna | 1902 | | 2,500 | | 74 | | | 3,700 | 294,300,000 | 36.0 | Olig. ss. |

**BURMA REFINING**

| Company and address—Refinery location | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Burmah Oil Co. (Burma Concessions), Ltd., P.O. Box 1049, Merchant St., Rangoon—Chauk | [1]3,000 | | | |

(1) Company also rebuilding the old Syriam refinery near Rangoon. The plant was destroyed by the British in their World War II retreat from Burma. The new plant will operate at about 3,500-bbl. capacity.

**FORMOSA REFINING**

| Company and address—Refinery location | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Chinese Petroleum Corp., 71 Goan Chyan Road, Taipeu, Taiwan—Kaoshiung | 15,000 | 6,500 | 2,000 | |

## Formosa . . .

THE Nationalist Chinese Government continued exploration work on Formosa this year through Chinese Petroleum Corp., aided by the United Nations Technical Assistance Administration and the U. S. Foreign Operations Administration.

Plans for 1955 included a wildcat test a few miles southwest of the capital, Taipeh, on the north end of the island. Seismic work has been undertaken in Formosa for the first time, along the western coastal plain. Shothole drilling began late last year. Teikoku Oil Co., Tokyo, contracted to handle the seismic work.

Crude production from Formosa's two small fields averaged around 95 bbl. daily last year. Nearly half of this output came from one well in Chutauchi South Culmination field, discovered last year in the southern part of the island. The old field, Chuhuangken, is located in central Formosa. Chinsui gas field is nearing depletion. In 1954, gas production from Chinsui and from Chutauchi totaled 1,025,968 M.c.f., 94 per cent of the 1953 level.

C.P.C. operates a 15,000-bbl.-daily refinery at Taipei, and a small topping plant at Miaoli. A 10,000-bbl.-daily catalytic cracking unit and other facilities are being added to the refinery.

## India . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **1,221,880** | **Value** | **$0.2102** |
| **Population** | **357,000,000** | **Refining cap., B/D** | **73,700** |
| **Capital** | **New Delhi** | **Production, B/D** | **7,200** |
| **Currency** | **Rupee** | **Producing fields** | **2** |
| | **Reserves, bbl.** | **60,000,000** | |

ACTIVITY in India this year reflected the government's desire to become as self-sufficient as possible for petroleum needs.

The second, and largest, of three refineries to be built under a government-encouraged expansion program went on stream in mid-March. The plant, the 40,000-bbl.-daily Burmah-Shell Refineries, Ltd., refinery is located at Trombay Island about 10 miles from Bombay. The owners are Burmah Oil Co., Ltd., and Royal Dutch-Shell. This plant alone can fill about half of Indian demand for gasoline, kerosine, diesel and furnace oils, and asphalt.

Standard Vacuum Oil Co.'s 25,000-bbl.-daily refinery, also located on Trombay Island, was the first of the plants to go into operation. It went on stream in July 1954, operated by Standard-Vacuum Refining Co. of India. Construction of the third refinery began this year. It is Caltex (India), Ltd.'s, 13,500-bbl.-daily plant located at Vishkatnam on the East Coast.

A threatened oil shortage after the shutdown of Abadan in 1951 touched off the refinery building. In agreements reached between the companies and government, the government gave assurances against nationalization for 25 years, waived the requirement for 51 per cent Indian ownership, allowed importation of crude duty free, and made available foreign exchange for profits. In turn, the companies agreed to make refinery byproducts available to local industries, train Indians for refinery work, and offer minority stock in the local refining firms to Indian investors.

### Another Refinery Being Considered

At the present time, a proposal for another refinery is under study by the Indian Government. The plan is a joint Indian-Iranian-French proposal for a 30,000-bbl.-daily refinery which would be located north of Bombay on a peninsula jutting into the Arabian Sea. The Saurashtra state government has already approved the project. Details of financing are not available, but majority interest would be held by Indian industrialists at Bombay. The National Iranian Oil Co. and Krebs, a French refinery construction firm, would divide the minority interest.

Plans for a proposed coal-to-oil synthesis plant have advanced a stage further. One American and two German firms are making studies of a plant which would have an output of around 6,000 bbl. daily. The firms are Kellogg, New York, Lurgi Gesellschaft, Frankfort, and Heinrich Koppers, Essen. The scheme has been in the air for several years. It was dropped in 1948 and revived in 1953.

The government has taken a direct interest in oil exploration and has formed the Oil and Natural Gas Division of the Department of Natural Resources. Nearly $18,000,000 was budgeted for a 5-year program. Preliminary work has started in a 5,000-sq.-mile area near Jaisalmar, along the eastern border of West Pakistan. Seven Russian engineers will advise the government on exploration. An Indian spokesman said that a report to be made by the Russians after a survey would determine the extent of collaboration. At the same time, it was stated that refining help from Russia is not being considered.

Stanvac has a 10,000-sq.-mile concession on the Ganges

**INDIA PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Digboi | 1890 | | 3,000 | 30 | [1]560 | 190 | | | 54,000,000 | 36.0 | Mio. ss. |
| Nahorkatiya | 1953 | | 10,000 | 2 | | | | [2]7,200 | | 34.0 | Olig. ss. |

(1) Includes 370 wells on gas lift. (2) Includes both fields.

**INDIA REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Assam Oil Co., Ltd., Digboi, P.O. Upper Assam—Digboi | 5,900 | | 1,500 | |
| Burmah-Shell Refineries, Ltd., Bombay—Bombay | 40,000 | (1) | | (1) |
| Caltex (India), Ltd., P.O. Box 155, Bombay—Visakhapatnam | (2) | | | |
| Standard-Vacuum Refining Co. of India, Ltd., Anand Bhawan, 54 Warden Road, Post Bag No. 6516, Bombay—Bombay | 27,800 | 5,100 | 4,200 | [3]P-1,200 |
| Total India | 73,700 | 5,100 | 5,700 | |

(1) Capacity not reported. (2) 13,700-bbl. refinery with 7,600-bbl. cat cracker to be completed in 1957. (3) Planned.

Plain in northeast India, adjoining a concession across the border in East Pakistan. Headquarters for the exploration are in Calcutta. The government has a one-quarter interest in the program and is paying its share of the costs, up to $5,250,000. Assam Oil Co., Ltd., a Burmah Oil subsidiary, recently acquired a concession in the Jorhat area, 100 miles west of Digboi in northeast India. Surveys have been carried out and drilling is expected to begin early next year.

Assam Oil operates the only two producing fields in India. A recently completed well, Digboi 970, in old Digboi field was described as the best well to date, although production data were not given. The field has been a producer since 1890. Seven wells have been completed in Nahorkatiya field, discovered in 1953, 20 miles southwest of Digboi. Six of the wells are producers, with an output of about 500 bbl. daily.

Drilling at Nahorkatiya is of technical interest because of crooked-hole trouble due to hard formations and steep dips in wells that go to about 10,500 ft. To overcome the problems, drill collars believed to be the world's largest are used. They weigh 18,000 lb. each, are of 12-in. outside diameter, and are 50 ft. long. Surface pipe is 24½-in., casing sizes are 16-in., 10¾-in., and 7-in.; casing is set at 7,000 ft. in a 14¾-in. hole drilled through the 16-in. casing. The added weight on the bit from the drill collar also was helpful for the big surface hole. Nahorkatiya No. 7 was drilled to 10,350 ft. in 48 days, a field record. National Supply Co. supplied the collars.

Crude from Nahorkatiya field is moved to Assam Oil's 6,000 bbl. daily refinery at Digboi by a new 23-mile pipeline. To handle the combined output from the fields, refinery throughput has been stepped up by about 50 per cent. Most refinery products are consumed locally or in other sections of India. Wax, however, is an export commodity.

# Indonesia . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 735,865 | Value | $0.0881 |
| Population | 76,500,000 | Refining cap., B/D | 223,800 |
| Capital | Jakarta | Production, B/D | 234,492 |
| Currency | Rupiah | Producing fields | 53 |
| | Reserves, bbl. | 2,300,000,000 | |

OIL companies raised production and carried on expansion programs this year in Indonesia, a country rich in resources but troubled with political and economic unrest.

During the first 6 months, crude output averaged about 237,000 bbl. daily, against about 205,000 bbl. daily during the same period last year. The three operating

**INDONESIA**
**(Kalimantan)**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Anggana-Muara | 1902 | | 380-3,200 | 1 | 80 | | | 2,015 | 67,238,480 | 19.5-32.1 | Mio. sd. |
| Balik Papan (Klandasan) | 1903 | | 740-765 | | | | | | 241,290 | 14.7 | Mio. sd. |
| Bunju | 1930 | | 1,970-3,100 | 25 | | | | 7,659 | 3,391,540 | 24.4-32.4 | Plio. sd. |
| Sambodja | 1910 | | 160-4,400 | 1 | 47 | | | 900 | 56,357,120 | 23.3-31.2 | Mio. sd. |
| Sanga Sanga | 1897 | | 430-2,900 | | 81 | | | 3,070 | 153,128,850 | 19.5-32.1 | Mio. sd. |
| Sangatta | 1940 | | 1,640-4,200 | | | | | | 1,150 | 36.0 | Mio. sd. |
| Tandjung | 1938 | | 2,500-4,300 | | | [1]23 | | [2]24 | 798,540 | 38.5 | Eoc. sd. |
| Tarakan | 1906 | | 195-2,400 | 2 | 433 | | | 4,330 | 175,143,610 | 18.3 | Plio. sd. |
| Total Kalimantan | | | | 29 | 641 | 23 | | 17,998 | 456,300,580 | | |

(1) Field shut in, pipeline not yet available. (2) Production for own use.

**Ceram**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bula Lemum | 1897 | | 240-920 | | | | | | 8,203,000 | 23.0 | Plio., Tri. |

**Java**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Kawengan | 1926 | | 1,750-2,700 | 1 | 67 | | 1 | 11,683 | 61,631,810 | 33.4 | Mio. ls. |
| Kruka | 1929 | | 970-1,600 | | 50 | | | 686 | 8,536,490 | 27.3 | Mio. ls. |
| Ledok[1] | 1896 | | 320-3,200 | | | | | | 21,299,790 | 43.0 | Mio. sd. |
| Lidah Kuldon[1] | 1896 | | 490-1,330 | | | | | | 33,369,000 | 24.5 | Mio. ls. |
| Nglobo-Semanggi-Benjuasin[1] | 1897 | | 370-3,350 | | | | | | 18,604,190 | 43.0 | Mio. sd. |
| Total Java | | | | 1 | 117 | | 1 | 12,369 | 143,441,280 | | |

**INDONESIA REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| N.V. de Bataafsche Petroleum Mij.: | | | | |
| Balik Papan | 55,000 | | | |
| P. Brandan[1] | | | | |
| Pladju | 90,000 | | 25,000 | |
| Tjepu | 4,600 | | | |
| Wonokromo | 3,200 | | | |
| N.V. Standard-Vacuum Petroleum Maatschappij, Post Bus 109, The Hague—Sungei Gerong | 71,000 | [2] | 34,500 | V-25,500, Alky-800,[3] Ck-120 |
| Total Indonesia | 223,800 | | 59,500 | |

(1) Refinery now impossible to operate. (2) 11,400-bbl. catalytic cracking unit planned. (3) Tons daily.

## SUMATRA

### (Southern District)

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Abab | 1951 | | 6,000 | 6 | | | | 580 | 852,143 | 35.0 | Tert. sd. |
| Babat | 1901 | | 100-1,050 | 1 | 17 | | | 30 | 8,424,540 | 38.8 | Mio. sd. |
| Badjubang | 1927 | | 2,700-3,300 | 14 | 15 | | | 2,590 | 31,618,370 | 46.9 | Mio. sd. |
| Benakat | 1933 | | 1,500 | 145 | | 7 | | 16,600 | 63,722,444 | 38.0 | Tert. sd. |
| Betun | 1949 | | 6,500 | 8 | | | | 1,230 | 2,575,026 | 35.0 | Tert. sd. |
| Betung | 1923 | | 180-950 | | | | | | 2,165,770 | 40.5 | Mio. sd. |
| Djirak | 1930 | | 900 | 99 | | 7 | | 4,750 | 36,852,707 | 38.0 | Tert. sd. |
| Gunung Kemala | 1938 | | 6,070-6,250 | 16 | | | 2 | 6,010 | 8,934,330 | 35.6 | Mio. sd. |
| Karang Rining | 1903 | | 160-1,200 | | | | | | 1,510,110 | 42.5 | Mio. sd. |
| Kenali Asam | 1931 | | 1,700-4,100 | 36 | 53 | | | 15,380 | 49,691,660 | 24.3-44.8 | Mio. sd. |
| Kluang | 1914 | | 2,300-2,600 | | | | | | 28,704,430 | 48.0 | Mio. sd. |
| Kruh | 1941 | | 3,300 | 7 | | 2 | | 120 | 1,389,930 | 38.0 | Tert. sd. |
| Limau | 1928 | | 5,200-5,400 | 25 | 3 | 5 | 1 | 15,900 | 22,295,970 | 31.1 | Mio. sd. |
| Mangundjaja | 1935 | | 660-2,200 | | 51 | | | 1,990 | 14,889,830 | 24.5 | Plio. sd. |
| Meruo Senami | 1938 | | 2,400-2,650 | | | | 1 | | 95,710 | 48.0 | Mio. sd. |
| Muara Enim Complex | 1903 | | 300-1,150 | | 2 | | | 20 | 28,671,630 | 49.9 | Plio. sd. |
| Prabumlih West | 1953 | | 5,600 | 4 | | | 1 | 3,180 | 1,782,610 | 31.3 | Mio. sd. |
| Radja | 1940 | | 6,500 | 25 | | 2 | | 4,170 | 8,208,223 | 40.0 | Tert. sd. |
| Setiti | 1936 | | | | | | | | | 26.0 | Mio. sd. |
| Suban Djerigi | 1905 | | 1,300-2,500 | | 1 | | | 400 | 36,120,010 | 49.9 | Plio., Mio. |
| Talang Akar-Pendope | 1922 | | 2,800 | 365 | | | | 43,020 | 233,413,042 | 38.0 | Tert. sd. |
| Talang Djimar | 1937 | | 3,600-4,200 | 52 | 37 | | | 20,915 | 81,579,440 | 28.8 | Mio. sd. |
| Tandjung Tiga | 1940 | | 4,400-4,600 | 8 | 11 | | | 4,105 | 12,667,450 | 27.6 | Mio. sd. |
| Tempino | 1931 | | 1,930-2,700 | 19 | 70 | | | 7,625 | 53,561,440 | 46.2 | Mio. sd. |
| T. Luntar | 1912 | | 2,200-2,800 | | | | | | 4,312,090 | 56.0 | Plio. sd. |
| Total Southern District | | | | 830 | 260 | 23 | 5 | 148,615 | 734,038,905 | | |

### (Central District)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Duri | 1940 | 1,000 | 730 | | | 6 | | | [1]12,377 | 30.0 | Mio. |
| Kotabatak | 1952 | 400 | 4,800 | | | 2 | | | [1]4,896 | 32.0 | Mio. |
| Minas | 1944 | 27,600 | 2,460 | 98 | | 40 | | 55,000 | 46,844,992 | 36.0 | Mio. |
| Pungut | 1951 | 600 | 2,940 | | | 2 | | | [1]6,893 | 39.0 | Mio. |
| Sago | 1940 | | 1,800 | 5 | | 21 | 1 | 510 | 538,259 | 34.0 | Tert. sd. |
| Sebanga[2] | 1940 | 300 | 1,200 | | | 3 | | | [1]2,369 | 30.0 | Mio. |
| Total Central District | | | | 103 | | 74 | 1 | 55,510 | 47,409,786 | | |

(1) Produced for own use. (2) Inactive since World War II.

### (Northern District)[1]

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dj Rajeu | 1929 | | 2,520-2,590 | | | | | | 559,000 | 54.5 | Plio. sd. |
| Gebang | 1936 | | 2,970-3,400 | | | | | | 135,000 | 54 | Mio. sd. |
| Pangkalan Susu | 1917 | | 1,550-2,100 | | | | | | 6,287,000 | 56 | Mio. sd. |
| Pace | 1939 | | 2,000 | | | | | | 52,000 | 23-30 | Tert. sd. |
| Pulu Pandjang | 1928 | | 1,640-2,400 | | | | | | 11,243,000 | 55.5 | Mio. sd. |
| Perlak | 1900 | | 160-2,200 | | | | | | 47,870,000 | 57 | Mio. sd. |
| P. Tabuhan | 1937 | | 3,300-3,500 | | | | | | 3,283,000 | 52.5 | Mio. sd. |
| Rantau | 1929 | | 1,040-2,560 | | | | | | 55,513,000 | 48.5 | Mio. sd. |
| Serang Djaja | 1926 | | 3,560-4,150 | | | | | | 7,551,000 | 64.5 | Mio. sd. |
| Telaga Said D.K.G. | 1893 | | 210-720 | | | | | | 23,621,000 | 51.5 | Mio. sd. |
| Total Northern District | | | | | | | | | 156,114,000 | | |

(1) No company activities.

## BRITISH BORNEO PRODUCTION

### British Borneo, State of Brunei

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Seria | 1929 | | 1,300-7,300 | 129 | 140 | 90 | 4 | 107,784 | 303,221,420 | 19-38 | Tert. sd. |

### British Borneo, State of Sarawak

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Miri | 1911 | | 300-3,050 | | 170 | 160 | | 1,290 | 73,485,699 | 21.5-35 | Tert. sd. |

## BRITISH BORNEO REFINING

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Sarawak Oilfields, Ltd., Miri—Lutong | 47,300 | | | |

## NETHERLANDS NEW GUINEA PRODUCTION

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Klamono | 1936 | | 300 | 1 | 18 | | | 4,780 | 11,480,220 | 18.9 | Mio. ls. |
| Mogoi | 1940 | | 1,250 | 1 | 25 | | | 3,600 | 3,030,910 | 45.0 | Mio. ls. |
| Wasian | 1940 | | 2,900-3,225 | 4 | | | | 700 | 333,950 | 45.8 | Mio. ls. |
| Total Netherlands New Guinea | | | | 6 | 43 | | | 9,080 | 14,845,080 | | |

## EAST INDIES

**. . . rebuilding about completed. Area expands outlets for crude and products.**

companies are Royal Dutch-Shell, through De Bataasfsche Petroleum Mij., Standard-Vacuum Oil Co., and Caltex. Shell is the largest producer. Its output from fields in Borneo, Java, and South Sumatra averaged 109,000 bbl. during the first half. Stanvac operates in South and Central Sumatra.

Caltex is the newest producer. Output from its single Minas field in Central Sumatra was developed after World War II. From January through June, production averaged about 56,000 bbl. daily, compared with around 37,000 bbl. daily the first half of 1954. At midyear, there were 98 flowing wells in the field, 27 more than at the same time last year. Because the company has no refinery in Indonesia, its entire output is shipped abroad. Crude is carried by pipelines to a terminal at Perawang and shipped down river to a tanker terminal at Sungei Pakning.

Stanvac has an $80,000,000 expansion program under way which will be completed by 1958. Modernization of the 71,000-bbl.-daily Sungei-Gerong refinery will cost $20,000,000. New units will include catalytic cracking and catalytic polymerization plants. A 90-mile pipeline with a capacity of 20,000 bbl. daily will make crude from Lirik field in Central Sumatra available for the first time in 1958. Another project in the program is a modern office building under construction at Palembang.

Shell is in a somewhat different position in Indonesia from that of Caltex. It has invested large sums in Indonesia since the war, but its fields in North Sumatra were never returned after World War II. These have a production potential in the neighborhood of 20,000 bbl. daily. The government has not announced its intentions toward the properties. At present, the government supervises small production in the area, which is consumed locally

The companies operate under "let alone" agreements with the government. These regulate the use of exchange earnings after obligations to the government have been met. The purpose of the arrangements is to permit companies to spend funds for the rehabilitation and development of the local industry without going to government authorities for foreign exchange. Earlier agreements of Stanvac and Caltex have been replaced. The Shell agreement terminated this year and negotiations for renewal are under way.

The government has not opened new lands for concessions and has not laid down a permanent policy on the agreement. Petroleum accounted for nearly one-quarter of the country's export earnings last year, which were higher than prewar levels. From the standpoint of the world-wide picture, the Indonesian oil industry has the task of remaining competitive with the Middle East.

This year, Shell, the leading Far East supplier, began price postings for the first time. Prices listed are f.o.b. Pulu Bukom terminal, Singapore. The only previous postings for this part of the world were for Sarawak Oilfields.

## British Territories of Borneo . . .

**NORTH BORNEO**
**(British North Borneo, Brunei, and Sarawak)**

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **81,726** | **Refining cap., B/D** | **47,300** |
| **Population** | **915,000** | **Production, B/D** | **109,074** |
| **Currency** | **Dollar** | **Producing fields** | **2** |
| **Value** | **$0.329** | **Reserves, bbl.** | **500,000,000** |

ROYAL DUTCH-SHELL'S Seria oil field in British Borneo is the most prolific producer in the British Commonwealth with an output averaging better than 100,000 bbl. daily.

British Malayan Petroleum Co., Ltd., is operator for the field, located in the State of Brunei. A natural-gas-processing plant with a capacity of about 2,100 bbl. daily was officially commissioned this year by the ruling sultan.

A 40-mile, 4-in. pipeline carries the gasoline to the Lutong refinery in northern Sarawak for further blending. A new 700-bbl.-daily topping unit is also in operation, making Seria field self-sufficient for most product needs.

The 47,300-bbl.-daily Lutong refinery is operated by another Shell subsidiary, Sarawak Oilfields, Ltd. The company also is carrying on an exploration program and has planned three wildcats in the coastal Balingian River basin. At present, the company has one field, Miri, discovered in 1911. Production has fallen off to about 1,400 bbl. daily.

British Malayan this year made the first promising show of oil since postwar exploration began in British Borneo. A wildcat started on May 5 at Jerudong in Brunei struck the oil formation at around 3,500 ft. The well is located about 45 miles northeast of Seria field, a vicinity where Shell had done intermittent exploration work without success since before World War I. At present, offshore work is under way off Seria field in an effort to extend production.

## New Guinea . . .

| NETHERLANDS NEW GUINEA | | | |
|---|---|---|---|
| Area, sq. miles | 159,375 | Production, B/D | 9,080 |
| Population | 1,018,000 | Producing fields | 3 |
| Capital | Hollandia | Reserves, bbl. | 50,000,000 |

PETROLEUM operations carried out in both political units of New Guinea have been disappointing so far.

Companies trying to find and develop oil in Netherlands New Guinea, an area also claimed by Indonesia, have spent more than $110,000,000 since the project got under way in the 1930's. Only three small fields have so far produced crude in the country. The average daily output dropped off to 8,200 bbl. daily in September after monthly decreases from 12,500 bbl. daily in January.

Nederlandsche Nieuw Guinee Petroleum Mij. (N.N.G.P.M.) is the operating company for participating firms. These are De Bataafsche Petroleum Mij. (Royal Dutch-Shell), and Standard Vacuum Oil Co., each with 40 per cent interest, and Far Pacific Investments, Inc., (Standard Oil Co. of California and The Texas Co.) with 20 per cent interest.

### Pipeline Takes Crude to Maturi River Terminal

A 51-mile pipeline completed last year carries crude from Wasain and Mogoi fields to a terminal on the mouth of Muturi River. Crude from Klamono is carried by a 30-mile line to Sarong. The field is located in the western section of Vogelkop, a peninsula on the eastern end of New Guinea where extensive exploration work has been done.

Exploration in Australian New Guinea is carried on by D'Arcy Petroleum Co., Ltd. It is the operator for a venture by British Petroleum Co. Ltd. and Stanvac. An Australian firm, Oil Search, Ltd. has a 10 per cent interest. Work is centering in western Papua where the climate is extremely difficult. Rainfall up to 350 in. a year is common. Late this year, sites were being prepared for two new tests. A wildcat, Aramia 1, has passed 5,500 ft. Two wells drilled earlier at Amati ran into difficulty. One test drilled to 13,743 ft. was stopped after high-pressure gas caved the hole and froze the pipe.

## Japan . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 147,690 | Value | $0.0028 |
| Population | 84,300,000 | Refining cap., B/D | 189,500 |
| Capital | Tokyo | Production, B/D | 6,078 |
| Currency | Yen | Producing fields | 49 |
| | Reserves, bbl. | 22,000,000 | |

THE growth of the refining industry has been one of the high points in Japan's reborn economy. Rising domestic demand and possibilities of exports have spurred expansion. The government also has encouraged it because of economic advantages of home refining. At mid-year Japan's 18 refineries had a total throughput of 225,500 bbl. daily, several times the level achieved in either prewar days or wartime.

The previous peak throughput capacity was reached during the war when refineries had a total capacity of 70,000 bbl. daily. Two-thirds of this capacity was destroyed by heavy Allied bombardment. After the war, occupation forces closed all remaining refineries, except those on the west coast charging indigenous crude.

In July 1949, refineries were granted permission to reopen. Actual operations got under way in January 1950. Since that time, capacity has increased each year as follows:

CRUDE THROUGHPUT CAPACITY
(In barrels daily)

| | Pacific coast | Japan sea coast | Total |
|---|---|---|---|
| Dec. 1950 | 52,405 | 15,853 | 68,258 |
| Dec. 1951 | 82,434 | 21,602 | 104,036 |
| Dec. 1952 | 113,076 | 20,484 | 133,560 |
| Dec. 1953 | 127,641 | 25,215 | 152,856 |
| Dec. 1954 | 174,834 | 28,273 | 203,107 |
| Mid-year 1955 | | | 225,507 |

The new facilities were designed to produce quality products, especially high-octane gasoline and high-grade lubricating oils, in order to meet competition from imports of these products.

U.O.P. Platforming units were completed at Nippon Petroleum Refining Co., Ltd.'s, Kudamatsu refinery and Koa Oil Co., Ltd.'s, Marifu refinery in December 1953, and at Showa Oil Co., Ltd.'s, Kawasaki refinery in March 1954. An Esso Research & Engineering Co. (ERECO) type fluid hydroformer was placed in service last December at Wakayama refinery of Toa Nenryo Kogyo, K. K.

Four catalytic crackers also are in service. An ERECO fluid unit went on stream at the Yokahama plant of Nippon Petroleum Refining last December. A U.O.P. fluid unit was installed in Maruzen Oil Co., Ltd.'s, Shimotsu refinery in March. A Houdriflow unit was completed in May at Diakyo Oil Co., Ltd.'s, Yokkaichi refinery. Japan's fourth catalytic cracker will be added by Toa Nenryo Kogyo. Other new facilities include solvent dewaxing, deasphalting, and extraction plants.

Foreign oil companies became affiliated with Japanese firms about the same time the refineries were reopened, and outside capital played an important role in rehabilitating the industry. Foreign firms have a 29.1 per cent share in the over-all investments of the nine leading refining companies, and are affiliated with five of them. Standard-Vacuum Oil Co. holds 55 per cent interest in Toa Nenryo Kogyo. Half interest is held by: California Texas Corp. (Caltex) in Nippon Petroleum Refining; Caltex Oil Products Co. in Koa Oil; Tide Water Associated Oil Co. in Mitsubishi Oil Co., Ltd.; and Anglo-Saxon Petroleum Co. (Royal Dutch-Shell) in Showa Oil.

Caltex companies have major refinery expansion programs under way. An additional 15,000-bbl. per calendar

day crude capacity was expected to be ready for service late this year at Koa Oil's 15,000-bbl.-daily Marifu refinery. Plans call for increases at both Nippon Petroleum Refining plants in 1956. Twenty-thousand barrels per calendar day will be added at the 22,480-bbl.-daily Yokohama plant, and 15,000 bbl. per calendar day will be added to the 9,200-bbl.-daily Kudamatsu plant.

An oil trading firm, Idemitsu Kosan Co., may build a 20,000-bbl.-daily plant at Tokuyama. The proposed plant would use Iranian Oil Co. royalty crude. Construction would take about 2 years and would begin around 6 months after government approval is granted.

Anglo-Saxon Petroleum, through Showa Oil, may participate in a refinery-petrochemical venture. A 30,000-bbl.-daily refinery may be tied in with a petrochemical plant built by Mitsubishi Chemical Co., another Shell affiliate. The plants may be built in the Tokuyama vicinity.

An all-Japanese firm, Nippon Mining Co., Ltd., is adding 6,000 bbl. daily capacity at its 5,304-bbl.-daily Funakawa refinery. Toa Oil Co., Ltd., has undertaken construction of a 6,000-bbl. refinery at Kawasaki

Crude throughput last year averaged 129,900 bbl. daily, up 24 per cent over the previous year. Feed stock consisted of 95.9 per cent imported crude and the remainder domestic production. The Middle East was the chief source of imports, accounting for 76.9 per cent. Other sources were the Far East, 19.7 per cent; North America, 2 per cent; Europe, 0.9 per cent; and South America, 0.5 per cent. Products imports last year averaged 51,000 bbl. daily, off 0.3 per cent due to new refinery construction.

Crude production in Japan dates back to the 1870's, or earlier. The two peak production years were 1915, when the average was 8,100 bbl. daily, and 1937, when 6,800 bbl. daily was achieved. Because of social instability, the unplanned production and lack of exploration during the war, crude output dropped after the war.

At the present time, a government-subsidized 5-year program to build up domestic production aims at increasing crude reserves to about 57,000,000 bbl. in 1958.

**JAPAN PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hachimori | 1938 | 83 | 1,480 | 3 | 42 | 5 | | 81 | 896,887 | 16 | Mio. fluct., vol. |
| Yabase | 1934 | 1,768 | 320-5,580 | 146 | 349 | 85 | 9 | 3,835 | 16,962,322 | 28-36 | Mio. sd., tuff sh. |
| Innai | 1934 | 132 | 2,540 | | 185 | 37 | 1 | 353 | 4,906,409 | 22.3 | Mio. sd., tuff sh. |
| Ishinazaka | 1944 | 14 | 650 | 3 | 13 | 3 | | 83 | 613,563 | 18 | Plio. sd. |
| Mogami | 1952 | 23 | 1,500-2,550 | | 17 | 2 | 2 | 102 | 52,000 | 17-28 | U. Mio. |
| Niitsu | 1896 | 265 | 420-4,270 | 1 | 660 | 115 | 1 | 420 | 18,823,865 | 18.6 | Mio. tuff or sd. |
| Higashiyama | 1893 | 198 | 590-2,100 | | 243 | 9 | 3 | 182 | 7,370,345 | 33.4 | Mio. sd. |
| Nishiyama | 1897 | 414 | 1,050 | 2 | 296 | 12 | 1 | 178 | 12,402,608 | 37.4 | Mio. sd. |
| Others | | 1,439 | | 1 | 1,517 | 93 | 1 | 844 | 34,218,544 | | |
| Total Japan | | | | 156 | 3,322 | 361 | 18 | 6,078 | 96,246,543 | | |

**JAPAN REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Daikyo Oil Co.—Yokkaichi | 14,000 | | | |
| Koa Oil Co., Ltd., Tokyo—Marifu | 25,000 | | 1,400 | L-320, A-75, P-1,350 |
| Maruzen Oil Co., Nagahori Building, 3,1-Chome Nagahoribashi-Suji, Minamiku, Osaka: | | | | |
| Kudamatsu | 11,000 | 3,000 | | (1) |
| Matsuyama | 8,500 | | | |
| Mitsubishi Oil Co., No. 1 Shiba-kotohirasho, Minato-ku, Tokyo— | | | | |
| Kawasaki | [2]25,200 | | | [2]R-1,200, L-700, [2]Hydro-3,000 |
| Nihon Mining Co.—Funakawa | 3,000 | | | |
| Nippon Oil Co.: | | | | |
| Tsuchizaki | 4,000 | | 850 | |
| Niigata | 2,000 | | | |
| Kashiwazaki | 1,400 | | | |
| Nippon Petroleum Refining Co., Ltd., Tokyo: | | | | |
| Yokohama | [3]20,000 | 5,000 | | L-1,300, A-750 |
| Kudamatsu | [3]7,000 | | | R-1,200, L-500, A-500 |
| Showa Oil Co.: | | | | |
| Hirasawa | 3,000 | | | |
| Niigata | 10,000 | | | |
| Kawasaki | 12,000 | 1,200 | | |
| Toa Nenryo Kogyo K. K., Tokyo: | | | | |
| Wakayama | 36,700 | (4) | 3,900 | V-4,500, R-4,700, L-750 |
| Shimizu | 6,700 | | | V-3,400, L-500, A-300 |
| Total Japan | 189,500 | 9,200 | 6,150 | |

(1) M.E.K. Plant to be completed in June 1956. (2) Planned. (3) 20,000 bbl. additional planned at Yokohama for 1956. Additional 15,000 bbl. planned for 1956 at Kudamatsu. (4) Cat cracker with 10,000 bbl. capacity planned.

Thereafter, crude would be produced at the rate of 17,500 bbl. daily. At this level, the ratio of reserves to annual crude output would be 9 to 1. Last year, crude reserves were officially estimated at 20,500,000 bbl. Crude output in 1954 averaged 5,800 bbl. daily, and natural-gas production, 130 M.c.f. daily. This year, crude production has averaged around 6,100 bbl. daily. Japan aims at proved reserves of 56,700,000 bbl. and daily production of 17,200 bbl. by 1959.

Under the mining law, only Japanese citizens and firms can hold production rights and leases. At present, 97 per cent of domestic output is controlled by Teikoku Oil Co., Ltd., which became a private firm after the war. The company's exploration program is carried out by 1 gravity, 5 seismic, 14 geological, and 3 core-drilling crews.

At the beginning of the year, Japan's 3,530 producing wells had an average output of 1.6 bbl. daily. Most of the 6,000 prewar wells either have been, or will be abandoned due to new production techniques. The main field is Yabase, located in northwest Honshu Island. Last year, it accounted for 60 per cent of total crude production.

Several companies are considering construction of petrochemical plants. A total of around 300,000 tons of petrochemical products a year could be turned out if all plans materialize, including those which at present are very indefinite. Most of the plants would use gas from cracking and reforming units. Plans also have been discussed for using natural gas. At present, the only petrochemical manufacturer is Nippon Gas Chemical Industry Co. which makes 1,000 tons of methanol and 600 tons of formaldehyde per month from natural gas.

## Pakistan . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **350,000** | **Value** | **$0.2104** |
| **Population** | **76,000,000** | **Refining cap., B/D** | **4,000** |
| **Capital** | **Karachi** | **Production, B/D** | **5,500** |
| **Currency** | **Rupee** | **Producing fields** | **4** |
| | **Reserves, bbl.** | **22,000,000** | |

PIPELINE construction, stepped-up oil exploration, and successful wildcatting made 1955 a memorable year for Pakistan's oil industry.

The 348-mile, 16-in. pipeline from Sui field to Karachi in West Pakistan was opened in September. It is the first long-distance natural-gas system in Southern Asia, and the only important one in the Eastern Hemisphere outside of southwestern France and northern Italy.

Sui Gas Transmission Co., Ltd., a firm controlled by Pakistani investors, including the government, carried out the project. Burmah Oil Co., Ltd. holds an interest in the line and will operate it under a long-term agreement. A third firm, British Commonwealth Development Finance Co., Ltd., also has capital in the line. The line was laid over difficult terrain in severe weather conditions. Major construction was done in 168 days. On the day of greatest progress, 401 welds were made. Pakistan Contractors, 75 per cent owned by Morrison Knudsen, Boise, Idaho, and 25 per cent by William Press, Ltd., London, handled construction. A firm known as Mother Cat, owned by Motherwell Bridge, Britain, and Construction & Trading, Lebanon, laid distribution lines in Karachi, Hyderabad, and Khairpur.

### Pipeline Projected

Sui gas will suply a second area by the end of 1956. Within 6 months, Pakistan Contractors will begin laying a 193-mile, 16-in. line that will link Sui with Multan, in southern Punjab. Stewarts & Lloyds, London, already has an order for half the pipe, and an Italian firm will furnish the rest. The government has plans for a 316,000-kw. power plant at Multan to be operated on natural gas. The German firm, Krupps, is studying plans for an iron and steel mill in the area.

Pakistan Petroleum, Ltd., a Burmah Oil subsidiary, discovered Sui field, located in Baluchistan, in 1952. Estimates of the field's gas reserves have been raised considerably. A recent estimate placed reserves at 4.5 trillion cubic feet, enough to fill domestic needs for a century. The field currently suplies about 45,000 M.c.f. daily during the initial stage of line operation.

Two test wells located within 30 miles of Sui field have found gas. A well at Uch, to the west, found gas at 6,000 ft., but P.P.L. planned to deepen the test to 10,000 ft. in search of oil. A test well at Zin, to the north, struck low-pressure gas of no commercial worth. The well was abandoned at 6,386 ft.

Nelson B. Hunt, Dallas independent, entered the oil play in West Pakistan this year. He and his wife obtained two 10,000-sq.-mile concessions. One area lies along the coast toward the Iranian frontier. The other is located

**PAKISTAN PRODUCTNON**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Balkassar | 1946 | | 8,000 | 6 | | 2 | | [1]1,300 | | 26.0 | Eoc. ls. |
| Dhulian | 1937 | | 8,300 | 21 | | | | | | 35.0 | Eoc. ls. |
| Joyamair | 1944 | | 7,000 | 1 | | 1 | | | | 22.0 | Eoc. ls. |
| Khaur | 1915 | | | | | | | | | 37.0 | U. Tert. ss. |
| Total Pakistan | | | | 28 | | 3 | | 5,500 | 5,094,450 | | |

(1) Total for Balkassar includes Pakistan Petroleum, Ltd., only. (2) Pakistan total includes Attock Oil Co., Ltd.

**PAKISTAN REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Attock Oil Co., Ltd., 24-28 Lombard St., London, E.C. 3—Rawal Pindi | 4,000 | | | |

**PHILIPPINES REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Caltex (Philippines), Inc., Manila—Batangas | 13,000 | 5,400 | | V-7,500, P-560 |

north of Karachi in the Indus River Valley. Hunt is the son of H. L. Hunt, president of Hunt Oil Co.

Under the agreement, Hunt interests will spend up to $42,000,000 in an exploration program. The Pakistan Government holds a one-quarter interest in the venture and will pay one-quarter of the costs on each concession, up to $5,250,000. If crude is found, Hunt will buy the government's share at wellhead value. Another provision provides for 50-50 division of profits. Considerable preliminary work already has been done, and the first well is due to be started around the turn of the year.

Standard-Vacuum Oil Co. took out concessions totaling 20,000 sq. miles in September 1954. Two 5,000-sq.-mile blocks are located in the Indus River valley of West Pakistan. A 10,000 sq.-mile block was taken out in the western part of East Pakistan. This agreement also includes a 50-50 profit-sharing plan and 25 per cent government participation. At the present stage of operations, Stanvac exploration parties are actively carrying out preliminary work.

### A Promising Discovery

A wildcat drilled by P.P.L. in the northwest corner of East Pakistan was one of the year's most promising discoveries. The well, Sylhet No. 1, struck a high-pressure gas formation in May. It was the first show of either gas or oil found in East Pakistan. Evidence of gas was found at 7,800 ft. and casing cemented at 7,727 ft. Three days after cementing, the well blew out, cratered, and caught fire about 300 yards from the rig. Flames rose to about 400 ft. at their peak. Several camp buildings burned down and rig equipment was damaged. A firefighter, Myron Kinley, Houston, flew to the scene, but the fires died out of their own accord.

All crude production at the present time comes from four small fields in Potwar basin in Punjab province of West Pakistan. Output of around 5,400 bbl. daily fills less than 20 per cent of domestic demand. The fields, Khaur and Khulian which produce light crude, and Balkassar and Joya Mair which produce asphaltic crude, are operated by Attock Oil Co., Ltd., in which Burmah Oil has an interest. P.P.L. obtains some production from an extension of Balkassar field. Crude, including P.P.L.'s, is transported via pipeline to Attock Oil's refinery at Rawal Pindi.

## Philippines . . .

CHANCES are good that the Philippine Islands will be the scene of considerable exploration activity during the coming months.

Two companies have worked out a conflict of overlapping applications for exploration rights in the Cagayan Valley of northeast Luzon, thus eliminating a stumbling block in the way of government approval. The firms were Standard-Vacuum Oil Co. and Philippine Oil Development Co. (Podco), a local firm. Under the arrangement, the companies divided the contested area into three sections. Podco received two sections and both companies have an option on one-third of the production the other may develop on two of the areas.

Other companies interested in the exploration play include Caltex (Philippines), Inc., and San Jose Oil Co., Inc., which is jointly owned by Pantepec Oil Co. and Pancoastal Oil Co. Another Caltex company, American Overseas Petroleum, Ltd. (Amoseas), will conduct operations in the Cagayan Valley for Podco.

Last year, Caltex opened the first refinery in the Philippines. It is a 13,000 bbl. daily plant located on Batangas Bay in southern Luzon, around 72 miles south of Manila.

## Australia . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **2,974,581** | **Capital** | **Canberra** |
| **Population** | **8,450,000** | **Currency** | **Pound** |
| **Value** | **$2.24** | **Refining cap., B/D** | **161,700** |
| | **Reserves, bbl.** | **1,000,000** | |

REFINERY construction stole the spotlight from generally unsuccessful exploration in Australia in 1955. Two of the four refinery projects undertaken in recent years by major international oil companies were officially opened. The near-completed expansion, a total investment of $254,000,000, will virtually assure the commonwealth self-sufficiency in petroleum products.

The largest plant, British Petroleum Co., Ltd.'s, 60,000-bbl.-daily refinery at Kwinana, near Fremantle, West Australia, was formally opened October 25. Actual operations began in February when the first distillation unit

**AUSTRALIA REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | —Special processing— |
|---|---|---|---|---|
| Australasian Petroleum Refinery, Ltd., Box 131, Fremantle—Kwinana | 70,000 | 12,500 | | V-24,000, A-500, Hydro-5,600, R-6,000 |
| Australian Oil Refining, Ltd., Sydney, NSW—Kurnell | (1) | | | |
| Bitumen & Oil Refineries (Australia), Ltd., (BORAL), Sydney—Matraville | 16,500 | | | R-2,300, [2]A-50,000, Hydro-2,300 |
| Commonwealth Oil Refineries, Ltd., 90 William St., Melbourne—Laverton | (3) | | | |
| Shell Oil Co. of Australia, Ltd., Melbourne: | | | | |
| Clyde | 10,000 | | | |
| Geelong | 36,000 | | | |
| Standard-Vacuum Refining Co., Ltd.—Altona | 29,200 | 9,200 | | [4]R-5,500, L-670, [4]Alky-1,600, A-1,000 |
| Total Australia | 161,700 | 27,100 | | |

(1) Refinery with 22,000-bbl. capacity will go on stream in 1956. Other units will include a 13,900-bbl. vacuum distillation unit, a 13,000-bbl. fluid catalytic cracking unit, and a 1,450-bbl. catalytic polymerization unit. (2) Long tons per year. (3) Refinery with a 4,200-bbl. capacity now shut down. (4) Planned.

was commissioned 3 months ahead of schedule, 27 months after refinery construction began. By the time opening ceremonies were held, around 7,000,000 bbl. of crude had been processed. The $85,000,000 plant is operated for British Petroleum Co. by Australasian Petroleum Refinery, Ltd. M. W. Kellogg Co. was contractor. Fuel oil makes up about half the output. It is pumped through pipelines to Fremantle, Australia's largest bunkering port. Gasoline, kerosine, diesel and aviation fuels are among the other products. A 2,800-ft. jetty at the refinery can unload three 32,000-ton tankers at the same time. Crude supplies come from the Middle East. B.P. currently supplies about one-quarter of Australian demand.

In April, Standard-Vacuum Oil Co.'s 25,000-bbl.-daily plant at Altoona, near Melbourne, was officially placed in service. The plant, operated by Standard-Vacuum Refining Co., Pty., Ltd., was designed to supply 16 per cent of Australian demand, including 20 per cent of the gasoline requirements. Stanvac had operated a 2,000-bbl. daily lubricating oil and asphalt plant on the Altoona site since 1949. But the 12-fold expansion in effect maks the refinery a new one. Braun Transworld Corp. built the plant at a cost of $30,000,000. Next year, an alkylation unit will be added which will produce 1,600 bbl. daily of aviation gasoline.

The fourth refinery to be built by a major company will be completed within a few months when a 22,000-bbl.-daily Caltex plant at Kurnell, New South Wales, goes into operation. Australian Oil Refining, Ltd., is the operating company.

The first of the refineries to be built was Shell's 28,000-bbl.-daily plant at Geelong, near Melbourne. The plant was opened early last year, operated by Shell Refining (Australia) Pty., Ltd.

### Refining Capacity Boosted Greatly

These four refineries will boost Australian refining capacity to about 160,000 bbl. daily, compared with 40,000 bbl. daily in 1954 and 20,000 bbl. daily in 1951. This is more than adequate, for the time being, to handle domestic demand, which last year averaged 115,000 bbl. daily. Consumption has been rising about 10 per cent a year. The expanded capacity had the immediate result of allowing product exports from Australia for the first time. During the first half of 1955, about 290,000 bbl. of gasoline was shipped abroad.

Refining capacity will be further increased with a building program undertaken by Bitumen & Oil Refineries (Australia), Ltd. The company is owned 60 per cent by local interests and 40 per cent by Caltex. An expansion program is under way at the firm's 6,500-bbl.-daily refinery at Matraville, near Sydney. This includes the addition of a 10,000-bbl.-daily atmospheric-distillation unit. The firm also is building a refinery at Brisbane. The new plant, with an ultimate capacity of 10,000 bbl. daily, will be completed in 1957. At present, the company operates a small unit in Brisbane which processes residual shipped from Matraville.

### Oil Exploration in Australia

Keen interest in oil exploration continued during the year. Drilling operations in the Rough Range area of West Australia, where oil was found in 1953, drew industry-wide attention. After several stepout wells proved dry holes, a 30-ft. offset on the site of the discovery wildcat this year found oil in the same horizon as the initial test. The offset, 1A Rough Range, was drilled by Western Australian Petroleum, Pty., Ltd. (WAPET), owned 20 per cent by an Australian firm, Ampol, and 80 per cent by Caltex. During tests, about 16,900 bbl. of crude and 3,600 bbl. of water were recovered. Water encroachment became marked as tests proceeded and the well has been shut in.

The Rough Range discovery was in the Carnavorn basin, formerly called North West basin. The completion of 1 Rough Range in January 1954 launched a new wave of exploratory interest in Australia. The discovery well flowed oil at 3,605 ft. and the basal Cretaceous Birdsong sandstone at a rate of 550 bbl. on a 25-hour test. Seven subsequent wildcats on the Rough Range anticline failed to find Birdsong production. Emphasis now has shifted to a program of stratigraphic drilling on Rough Range and other structures in the area. Geophysical reconnaissance also is under way.

### Twelve Wells Completed

Between January 1, 1954, and this September, 12 wells were completed in Australia. These included the lone producer and a gas well. Some of the dry holes found oil traces insufficient to recover by drill-stem test. The gas producer was Associated Australian Oilfields N.L. 4 Roma, located in the Great Artesian basin. The well tested 1,250 M.c.f. daily from Triassic sands at 3,700 ft. Drilling also has been done in Fitzroy and Canning (formerly known as Desert basin), Gippsland, Sydney, Maryborough basins, and Bowen syncline, as well as in the Papua-New Guinea basin.

Several domestic companies are participating in exploration, including some in which foreign firms have an interest. One of these is Frome-Broken Hill Co., Ltd., partially owned by British Petroleum Co., Ltd., and Standard-Vacuum Oil Co. Shell Co. of Australia has a 75 per cent interest in a venture formed with Australian mining companies. An American independent, Gene Goff, Tulsa, holds controlling interest in Lucky Strike Drilling Co. which holds a concession along the Queensland coast.

## MEXICO

| | | | |
|---|---|---|---|
| Area, sq. miles | 760,383 | Value | $0.0802 |
| Population | 26,335,000 | Refining cap., B/D | 408,500 |
| Capital | Mexico City | Production, B/D | 255,032 |
| Currency | Peso | Producing fields | 8 districts |
| | Reserves, bbl. | 1,900,000,000 | |

THE Mexican oil industry underwent a general expansion this year as refining capacity rose and new pipelines opened to accommodate higher crude production.

The government agency, Petroleo Mexicanos (Pemex), raised crude output to about 252,000 bbl. daily the first 8 months, compared with last year's entire average of 229,000 bbl. daily. A setback occurred in September when a series of storms began which rocked Mexico for 6 weeks. Output fell off to 235,300 bbl. daily, but this level was still 4,400 bbl. daily above output in September 1954.

Oil in Mexico chiefly is found in three separate areas along the east coast. Northeast District, important for its gas fields, borders South Texas. North District, traditional mainstay of Mexican production before and after expropriation, is in the State of Veracruz, east and slightly north of Mexico City. South District is the second rank-

# MEXICO

**. . . general expansion was rule in 1955 as refining capacity rose and new pipelines opened.**

## MEXICO PRODUCTION

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Northeastern District | 1948 | 12,034 | 5,668 | 48 | 11 | | 2 | 3,574 | 6,892,867 | 49 | Olig. ss. |
| Northern District (Ebano-Panuco) | 1901 | 100,000 | 1,150 | 413 | 50 | | | 19,361 | 853,865,899 | 12 | Cret. ls. |
| Southern District (Golden Lane) | 1908 | 34,881 | 2,200 | 264 | 6 | | 1 | 17,611 | 1,140,617,907 | 20 | Cret. ls. |
| Poza Rica District | 1930 | 12,897 | 6,900 | 146 | 32 | | 6 | 98,430 | 615,974,003 | 35 | Cret. ls. |
| New Golden Lane | 1952 | 3,385 | 4,006 | 58 | | | 6 | 76,186 | 44,523,926 | 19 | Cret. ls. |
| Hidalgo-Guerrero | 1954 | 564 | 7,720 | 15 | | | 3 | 12,627 | 1,197,132 | 42 | Cret. ls. |
| Vera Cruz District | 1953 | 794 | 3,600 | 2 | | 11 | 2 | 5,575 | 1,577,766 | 15 | Cret. ls. |
| Isthmus and Tabasco | 1911 | 6,184 | 3,008 | 95 | 318 | | 5 | 21,668 | 203,614,663 | 35 | Mio., Olig. ss. |
| Total Mexico | | | | 1,041 | 417 | 11 | 25 | 255,032 | 2,868,264,163 | | |

## MEXICO REFINING

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| All the following operated by Petroleos Mexicanos, Av. Juarez, 94, Mexico City, D. F.: | | | | |
| "18 de Marzo" located at Atzcapotzalco | 100,000 | ( ) | 14,500 | R-39,000, Alky-1,200, I-500 |
| "Ing. Antonio M. Amor" located at Salamanca | (2)40,000 | | 5,000 | R-9,000, L-2,400 |
| "Madero" located at Madero | (3)89,000 | | 5,500 | R-12,000, A-3,200 |
| "Arbol Grande" located at Arbol Grande | 40,000 | | | A-750 |
| "Mata Redonda" located at Villa Cuauhtemoc, Ver. | 14,000 | | 6,000 | |
| "Reynosa" located at Reynosa | (4)7,000 | | | |
| "Poza Rica" located at Poza Rica de Hidalgo, Ver. | 94,500 | | | |
| "Minatitlan" located at Minatitlan | 24,000 | | | V-6,500, L-600 |
| Total Mexico | 408,500 | | 31,000 | |

(1) Vacuum unit of 30,000-bbl. capacity, 20,000-bbl. catalytic cracker, 3,000-bbl. alkylation unit, and 800-bbl. catalytic polymerization unit planned. (2) 30,000 bbl. additional atmospheric distillation and 10,000-bbl. catalytic cracker planned. (3) 50,000-bbl. distillation unit, 20,000-bbl. cat cracker, 1,500-bbl. alkylation unit, and 2,500-bbl. catalytic polymerization unit planned. (4) 10,000 bbl. additional distillation planned. 2,200-bbl. thermal cracking unit planned.

ing crude source. It lies on the Isthmus of Tehuantepec, the narrowest point in Mexico between the Caribbean Sea and Pacific Ocean.

The year's development reflected the different role each producing area plays in the industry. In North District, the outstanding highlight was a 20-year contract signed by Pemex and Texas Eastern Transmission Corp. for the sale of Mexican gas in the United States. Still subject to approval by the Federal Power Commission, the deal calls for initial delivery of 100 M.M.c.f. daily to be built up to 200 M.M.c.f. daily as new reserves are discovered.

Texas Eastern would take delivery at the newly built processing plant at Reynosa field. The company is expected to file an application for permission to build a 400-mile big-inch transmission line from Reynosa to Beaumont, Tex. At that point, the line would tie in with the company's main transmission system. The company did not quote a price, but Mexico City reports placed the figure at 14.2 cents M.c.f.

At the present time in this corner of Mexico, a 211-mile, 12 and 16-in. gas line is under construction from Monterrey to Torreon. A 133-mile, 20-in. line from Reynosa to Monterrey is projected. There also are plans for a 279-mile, 14-in. extension to the Monterrey-Torreon system.

Production from Veracruz is the heart of the Mexican oil industry. Poza Rica field and the famous Golden Lane oil fields are located here. The area supplies the oil consumed in the interior of Central Mexico, is a source of crude exports, and accounts for around 85 per cent of total production.

Pemex has discovered eight new fields in this region in little more than a year. Fields developed since 1952 in a new producing trend extending about 45 miles now produce more than 80,000 bbl. daily. Secondary-recovery operations in Poza Rica area also have added to output.

This year, facilities were opened at the Atzcapotzalco refinery at Mexico City. Capacity was increased from 64,000 bbl. daily to 100,000 bbl. daily. A 147-mile, 18-in. crude pipeline from Poza Rica to the refinery has a capacity of 90,000 bbl. daily. This line, was in addition to the existing system which has a crude capacity of 10,000 bbl. daily. A 30-mile, 16-in. line also was completed, connecting the Golden Lane system with Tuxpan on the coast.

Four products lines have been placed in service in the past 2 years. A 147-mile, 4-in. propane line parallels the Poza Rico-Mexico City crude line. The remaining lines connect the new Salamanca refinery with other interior cities. Two products lines are under construction: a 304-mile, 12-in. line running northward from the refinery at Tampico to Monterrey, and a 65-mile, 8-in. line extending the Salamanca-Aguas Calientes line to Zacatecas.

Pemex has carried on considerable exploration and development work south of the established producing area in Veracruz. Angostura field was discovered in 1953 and its output is now more than 8,300 bbl. daily. Other fields in this area are Casa Blanca and Tres Higueras, a 1955 discovery. Output is from Cretaceous horizons.

Expansion of the Minatitlan refinery, in the South District, from 25,000 to 50,000 bbl. daily was completed within the past few weeks. A large share of the output is scheduled to go through the 60-mile transisthmus pipeline to Salina Cruz on the Pacific. Products will then be shipped by tanker to Lower California and points along the west coast which until now have received supplies from the United States. This will save Mexico several million dollars a year in foreign exchange.

Pemex is continuing its exploration work in Lower California and in Yucatan Peninsula. During the first half of the year, a gravity survey was made in Lower California, in anticipation of seismic surveys and drilling to be started later. During the second half of the year, geological work was started in the northeast part of Chihuahua.

# SOUTH AMERICA

## Argentina . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 1,078,769 | Peso, free rate | $0.0560 |
| Population | 17,650,000 | Refining cap., B/D | 189,100 |
| Capital | Buenos Aires | Production, B/D | 84,000 |
| Currency | Peso | Producing fields | 6 |
| | Reserves, bbl. | 400,000,000 | |

THE overthrow of the Peron government in September abruptly ended plans for oil exploration and development by major companies, at least for the time being.

In the spring, it appeared quite possible that Standard Oil Co. of California would obtain the first concession granted in 20 years. The company and government had signed a contract, and President Peron had urged Parliament to approve. Negotiations also were under way with two international companies already operating in Argentina: Standard Oil Co. (N. J.) and Royal Dutch-Shell.

By the time of Peron's downfall, there was growing opposition to the Socal contract in Parliament. Peron's successor, General Lonardi, publicly pigeon-holed the agreement in his first speech. General Aramuru, in turn, succeeded Lonardi as provisional president. But whoever runs the country, it seems unlikely that the governing group would foster cooperation in the immediate future with foreign oil companies.

The prominent mention of oil in a time of political unrest signified that petroleum is one of Argentina's basic problems. The country has been unable to develop its own oil resources at the same rate its economy is expanding. A rising proportion of its oil, now about 60 per cent, must be imported, causing a severe strain on the trade balance. Faced by necessity, Peron's government came around to the view that enlisting the capital and technical aid of major companies would be in the best interest of Argentina.

### Provisions of Agreement

As a result, lengthy talks between California Standard and the government were undertaken. Interior Minister Orlando Santos and Owen J. Hayens, California vice president, signed a contract on April 25. The agreement provided that all production be retained in Argentina until domestic needs were met, was to endure for 40 years, and called for a 50-50 profit split. It covered exploration and development rights for about 18,800 sq. miles in western Santa Cruz.

Three provisions came under special criticism of the ultranationalistic opposition. These would have permitted the company to build its own roads, air strips, communications and terminal facilities; called for arbitration of company-government disputes by an executive of a foreign oil company; and gave Socal fairly firm protection from

losses by expropriation. Opponents charged that these provisions would give the United States a foothold for military bases and would endanger Argentina's sovereignty.

Under the arrangement, the contract was due to expire if Parliament failed to pass it by September 30. Deadline for the Jersey Standard agreement was the end of the year. Details of the Jersey Standard offer were not made public. But the proposal was described by officials in Peron's government as less complex than Socal's. Another company which had shown an interest in oil exploration in Argentina was Floyd Odlum's Atlas Corp., which made offers to Peron's government in 1954.

The government operating company, Yacimientos Petroliferos Fiscales (Y.P.F.) has increasingly dominated Argentina's oil industry since 1934, when the last concessions were granted to private companies. Y.P.F. accounts for most of the crude production, which this year will average around 82,000 bbl. daily. The company's chief difficulty is its lack of capital with which to develop new areas. Most of the production comes from the Neuquen, Comodoro Rivadavia, and Mendoza areas. Several new finds were reported in recent years. This year, Y.P.F. planned to further develop Campo Duran oil and gas field near the Bolivian border. A 700-mile pipeline is

**ARGENTINA PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Caleta | | | | | | | | | | | |
| Comodoro Rivadavia | 1925 | | 3,400-6,900 | | 445 | | | 8,064 | 88,627,023 | 25.0 | U. Cret. sd. |
| Mendoza | | | | | | | | | | | |
| Neuquen | | | | | | | | | | | |
| Salta | | | | | | | | | | | |
| Total Argentina[1] | | | | 5 | 1,300 | | | 84,000 | 579,092,000 | | |

(1) Due to government censorship, figures for total are estimated.

**ARGENTINA REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Cia. Condor, Levalle 27, Avellaneda—Avellaneda | 900 | | | |
| Cia. La Isura, S.A. Ave. Pte., Pena 699, Buenos Aires—Bahia Blanca | 2,000 | | 1,000 | |
| Diadema Argentina, S.A. de Petroleo, Roque 788, Saenz Pena, Buenos Aires—Buenos Aires | 21,000 | | 12,000 | |
| Esso, S.A.P.A., S.A. Avda, Roque Saenz Pena, 567, Buenos Aires: | | | | |
| Bahia Blanca | 5,500 | | 2,750 | |
| Campana | 25,000 | | 11,000 | |
| Dadin (Plaza Huincul) | 500 | | | |
| Manuel Elordi | 1,300 | | | |
| Lottero y Papini, Avellaneada—Avellaneada | 600 | | | |
| Ramon Gorleri, Quilmes—Quilmes | 1,500 | | | |
| Yacimientos Petroliferos Fiscales, Avda. Roque Saenz Pena 777, Buenos Aires: | | | | |
| Avellaneda | 6,000 | | 2,500 | |
| La Plata (Eva Peron) | 95,000 | | 25,000 | |
| Lujan de Cuyo | 5,000 | | 3,000 | |
| Plaza Huincul | 1,300 | | | |
| Comodoro Rivadavia | 5,500 | | 2,000 | |
| Salta | 2,000 | | | |
| San Lorenzo | 16,000 | | 6,200 | |
| Total Argentina[1] | 189,100 | | 65,450 | |

(1) Partly estimated.

**BOLIVIAN PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bermejo | 1924 | 67 | 4,000 | 1 | 7 | 1 | 2 | 550 | 1,318,180 | 26 | Perm. sd. |
| Camiri | 1927 | 750 | 4,500 | 25 | 8 | 9 | 5 | 7,377 | 6,636,246 | 55 | Dev. sd. |
| Guairuy | 1947 | 40 | 2,500 | 1 | | | 1 | 459 | 145,658 | 59 | Dev. sd. |
| Sanandita | 1926 | 150 | 2,300 | | 16 | | | 117 | 1,977,534 | 42 | Perm. sd. |
| Total Bolivia | | | | 27 | 31 | 10 | 8 | 8,503 | 10,077,618 | | |

**BOLIVIA REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Yacimientos Petroliferos Fiscales Bolivianos, Ave. Gral. Camacho, La Paz: | | | | |
| Camiri | 1,450 | | | |
| Cochabamba | 5,850 | | | |
| Sanandita | 410 | | | |
| Sucre | 4,630 | | | |
| Total Bolivia | 12,340 | | | |

(1) Two units, one of 1,100-bbl. capacity, one of 3,530-bbl. capacity.

**ARGENTINA** ... Peron overthrow ends expansion plans.

planned from the field, discovered in 1950, to San Lorenzo on the Platte River, where a 16,000-bbl.-daily refinery is located.

Private producing companies include Jersey Standard, Shell, and four domestic firms. Their total acreage amounts to 386 sq. miles. Because they are forbidden to acquire new areas, crude output is gradually tapering off and now amounts to one-fifth, or less, of total production. Petroquimica is a smaller government operation. It operates oil properties obtained from British National Railways of Argentina in 1948.

Y.P.F.'s new 28,300-bbl.-daily refinery at La Plata (Eva Peron) was scheduled to be in full operation around the end of this year. Facilities include fluid catalytic cracking, alkylation, and a delayed-coking unit. Along with the new refinery, La Plata also is the location of Argentina's largest plant, which has a capacity of around 95,000 bbl. daily. Jersey Standard is adding a lubricating-oil plant at its 25,000-bbl.-daily refinery at Campana, near Buenos Aires. The plant will have a minimum production of about 1,000 bbl. daily.

About two-thirds of Argentina's petroleum imports come from the sterling area. Under a renewed Anglo-Argentine trade agreement signed this year, Britain will deliver about $81,000,000 worth of oil by June 30, 1956. This amounts to 34 per cent of Argentina's purchases under the agreement. In a trade pact with U.S.S.R., Argentina was to receive about 9,000 bbl. daily of fuel oil, and 1,000 bbl. daily of gas oil from Red sources this year. In 1954, Russia supplied an average of 10,000 bbl. daily. Black oils made up about three-quarters of the shipments. Crude oil and some aviation gasoline made up the remainder.

## Bolivia . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **416,040** | **Value** | **$0.0055** |
| **Population** | **3,060,000** | **Refining cap., B/D** | **12,340** |
| **Capital** | **La Paz** | **Production, B/D** | **8,503** |
| **Currency** | **Boliviano** | **Producing fields** | **4** |
| | **Reserves, bbl.** | **50,000,000** | |

BOLIVIA is the only Latin-American nation that has been able to produce enough oil to meet its internal needs with a state-controlled oil industry formed after private property was expropriated. Bolivia has done even better. She now furnishes her own oil needs and exports crude and products to Argentina, Brazil, and Chile.

Bolivia will not only begin an expanded exploration and development program of her own next year, but she will also open a large area of the country to foreign capital on a concession basis.

Four new rotary rigs were purchased in the United States late this year by Yacimientos Petroliferos Fiscales Bolivianos, the government company in Bolivia. The rigs, rated at 5,000 ft. and 8,000-ft. capacities, will give Y.P.F.B. a total of 11 rigs. The new units will be used for both development and wildcat drilling in the southeastern section of Bolivia reserved to the government company under the new oil law.

The new oil law signed in October by President Victor Paz Estenssoro divides the country into four zones and opens three of them to foreign capital exploration and development. Applications for concessions may be made late in February after regulations for the new oil code are formulated. Concessions may be for exploration, exploration and development, refining, or transportation. The usual 50-50 profit split with the government applies. No oil discovered by a private company may go to domestic Bolivian markets. These are reserved for Y.P.F.B. unless domestic demand should exceed the government agency's production. If it should, the government can call on private companies to supply domestic needs.

Y.P.F.B.'s production from its fields in Camiri and Bermejo is now about double the 5,000 bbl. daily consumed in Bolivia. The remainder is exported to neighboring countries and is financing construction of railroads and other transportation facilities for the country.

Y.P.F.B. operates a 6,500-bbl. daily refinery at Cochabamba and a 4,800-bbl. daily plant at Sucre in addition to small topping plants at Camiri and Sanandita. Camiri field is linked to both the Sucre and Cochabamba refineries by pipeline. Another pipeline just completed this year by Williams Brothers moves Camiri crude southward to the Argentine border at Yacuiba. Y.P.F.B. began moving 2,500 bbl. daily through this 156-mile, 6-in. line in July. The crude is moved into Argentina by truck and tank car and helps pay Argentina for building a railroad between Yacuiba and Santa Cruz and a highway from Oran, Argentina, to Tarija, Bolivia.

Work got under way this year on another ambitious

**BOLIVIA** **. . . furnishes own needs and exports surplus.**

Bolivian pipeline project, a 6-in. products system linking Cochabamba, Oruro, and La Paz, the country's capital. Williams Brothers has the contract for the 220-mile line and will build it in two stages. The pipeline contractor has also started the preliminary engineering for an 8 and 10-in. line from near Oruro to Arica, Chile, on the Pacific Coast. This would be a 215-mile line and would drop from an elevation of nearly 15,000 ft. to sea level in the last 48 miles on the Pacific slope of the Andes. Studies are being made in connection with this project that could lead to the world's first petroelectric system. The pipeline contractor believes the crude-oil pressure in the sharply dropping line would drive a turbine and generate enough electricity to supply Arica, a city of about 30,000 population.

The only foreign company now operating in Bolivia is Glenn McCarthy, Inc., of Bolivia. The Houston independent signed a concession contract with Y.P.F.B. in 1953 after Bolivia relaxed its state-controlled monopoly policy and offered some areas of the country on a lease basis. None of the large oil companies expressed an interest in the Bolivian offer because of the terms offered and because land-locked Bolivia has no ready access to the seaboard and export markets.

McCarthy's efforts to date on the 970,000-acre concession have resulted in one gas well and a test that produced about 135 bbl. of oil daily and a high volume of gas. He sold a half-interest in the operation this year to Keljikan Commercial Corp., a New York import-export firm, for $2,000,000 to finance further development of the property. The price was first reported at $4,160,000, but was halved by a supplemental contract approved by McCarthy stockholders in August.

McCarthy has four wells in the Los Monos area of his concession. Terms of his agreement compelled him to start drilling in the Agua Salada area in the southern part of the concession area by late this year. McCarthy returned to the United States last month seeking further financing to build a 3,000-bbl. refinery at Concepcion, Paraguay, and a 450-mile pipeline to link the refinery with his concession area.

# Brazil . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 3,288,000 | Value, free rate | $0.0154 |
| Population | 52,620,000 | Refining cap., B/D | 105,800 |
| Capital | Rio de Janeiro | Production, B/D | 5,200 |
| Currency | Cruzeiro | Producing fields | 10 |
| | Reserves, bbl. | 27,000,000 | |

NEXT to the price of coffee and the presidential election, oil probably was the most important news topic in Brazil this year.

The government oil corporation, Petroleo Brasileiro, S. A. (Petrobras), made advances in both its over-all exploration and refinery-expansion program. But the accomplishment which stirred the excitement of oil-hungry Brazil was the wildcat discovery at Nova Olinda, deep in the Amazon basin.

The oil strike was a feather in the cap of Petrobras, which represents the government's efforts to develop Brazil's oil resources without the aid of the major oil companies. From a geological standpoint, Nova Olinda was of interest regardless of the size of the immediate discovery. The significance was that one of the only two wildcats so far drilled in the interior of Brazil had found oil.

The basin is twice the size of Texas. Walter K. Link, exploration chief for Petrobras and former chief geologist for Standard Oil Co. (N. J.), called the find "the greatest event in the Western Hemisphere since the discovery of Leduc in Canada and Williston basin in the United States."

Nova Olinda is about 100 miles southwest of Manaus, a stone's throw from the navigable Madeira River. Shows of oil were found at 1,200 ft. 2 years ago, causing a premature surge of public enthusiasm. On March 12 of this year, a drill-stem test from 8,910 ft. in carboniferous sandstone yielded 40.9°-gravity oil. Initial tests indicated a flow of more than 250 bbl. daily.

### Well Provides Geological Surprises

The well, together with Alter do Chao wildcat 310 miles eastward, provided geological surprises. Geophysical surveys had indicated basement rock from 3,300 to 8,200 ft., but a salt, anhydrite, and diabase section threw off predictions because it has a velocity similar to crystalline base. The greater share of Petrobras exploration work next year will be devoted to further studies of the Amazon basin. Six rigs will be drilling within 300 miles of Nova Olinda by the middle of next year.

The government organized Petrobras in 1953 as the successor to an earlier state organization, Conselho Nacional do Petroleo. It was given control of oil exploration, development, refining, and transportation of domestic oil. Its operations began in May 1954. Under the present arrangement, Petrobras has from $50,000,000 to $60,000,000 a year in foreign money at its disposal for payment of services and imported materials.

Petrobras was formed to speed up the development of the domestic oil industry. As in the case of many other countries with rapidly expanding economies, increasing consumption of petroleum weighs heavily on Brazil's imports bill. Despite the continued slump in world coffee prices, which to a large extent determines Brazil's income, oil demand increased about 10 per cent this year. Estimated consumption was 130,000 bbl. daily, against 118,000 bbl. daily last year.

Along with its wildcatting program in the Amazon basin, Petrobras also has concentrated on exploration and development work in Reconcavo basin of Bahia, the source of all present production. Output from this region was stepped up to better than 5,000 bbl. daily this year, double

the 1954 level. Next year's drilling program will spot 12 rigs in Bahia, 6 in Amazon, and 3 elsewhere.

Although Nova Olinda was the dramatic incident of the year, Petrobras' most solid gains were in its refinery program. The state company's first annual report stressed that its own, plus private refining, could meet 70 per cent of demand by the end of this year. Petrobras' biggest single project, Cubatao refinery near Santos, officially went into operation in April. The plant opened with a capacity of 50,000 bbl. daily and has been expanded to handle 60,000 bbl. daily. An asphalt plant with a capacity of 116,000 tons a year is nearly ready for full operation. A fertilizer plant of 375 tons per day capacity will go into operation during the first half of next year. Cubatao operates entirely on imported crude. Petrobras' Mataripe refinery, on the other hand, handles domestic output only. It was expanded from 2,500 bbl. daily to 5,000 bbl. daily this year. The company hopes to expand the capacity to 15,000 bbl. daily by 1957 and to add a lubricating-oil plant large enough to fill most domestic needs.

Brazil has two sizable refineries under private ownership, both of which are new. They are a 20,000-bbl.-daily plant on the outskirts of Sao Paulo, owned by Refinaria Exploracao de Petroleo Uniao, S.A., and a 10,000-bbl.-daily plant at Rio de Janeiro, owned by Refinaria de Manguinhos, S.A. A 5,000-bbl.-daily refinery at Manaus is scheduled to go on stream early next year. It is owned by Cia. de Petroleo da Amazonia, S.A. Crude supplies will be barged in from Ganso Azul field located along the eastern side of the Andes Mountains in Peru. Under Brazilian law, existing private refineries may not be expanded, and Petrobras may buy 51 per cent of their stock and convert the companies into subsidiaries.

One of the biggest questions in Brazil at the present time is whether the country will be able to supply adequate capital for Petrobras to achieve its goals. The corporation was organized with a capital of about $62,000,000 on the free exchange rate (4,000,000,000 cruzeiros). The government was sole owner. Actual assets amounted to about $48,500,000 (3,125,000,000 cruzeiros). Plans call for a capitalization increase to $155,000,000 (10,000,000,000 cruzeiros) by 1957, under government control.

The question of permitting foreign oil companies to enter the country, is a touchy one for political leaders. The Nova Olinda discovery was grist for speeches in the presidential election campaigns, but the subject of foreign companies was generally avoided. One candidate, Juscelino Kubitschek, said he would give Petrobras 1 year to do its job or look for an alternative solution.

## Chile . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **286,396** | **Value** | **$0.0050** |
| **Population** | **5,920,000** | **Refining cap., B/D** | **20,000** |
| **Capital** | **Santiago** | **Production, B/D** | **6,428** |
| **Currency** | **Peso** | **Producing fields** | **19** |
| | **Reserves, bbl.** | **25,000,000** | |

CHANCES that Chile might reverse its government-oil-monopoly policy and open the country to private capital oil exploration died—at least for the immediate future. The Ministry of Mines withdrew a bill it had before the Chilean Congress. It is to be revised and resubmitted.

The Chilean cabinet recommended inviting private companies to explore and develop Chile's oil outside of the country's only producing area, the Magallanes fields. The move came as a surprise and the industry was waiting to see what terms the government would offer when the bill was withdrawn.

Oil development in Chile has been a government monopoly since 1928 and it was not until 1949 that the country became an oil producer. Empresa Nacional de Petroleo

**BRAZIL PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, A.P.I. | Geological data or prod formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Agua Grande | 1950 | | 1,280 | 10 | 6 | | | | | 37.0 | Cret. ss. |
| Aratu | 1941 | | 800 | | 2 | | | | | 50.0 | Cret. ss. |
| Candeis | 1941 | | 1,000 | | 52 | | | | | 32.0 | Cret. ss. |
| Dom Joao | 1947 | | 350 | 20 | 85 | | | | | 38.0 | Cret. ss. |
| Itaparica | 1941 | | 800 | | 25 | | | | | 30.0 | Cret. ss. |
| Lobato-Joanes | 1939 | | 750 | | 4 | | | | | 31.0 | Cret. ss. |
| Mato Sao Joao | 1953 | | 3,800 | | 10 | | | | | 33.0 | Cret. ss. |
| Nova Linda | 1955 | | 8,910 | 1 | | | | | | 40-50 | Dev. sd. |
| Paramirim | 1950 | | 1,200 | | 2 | | | | | 35.0 | Cret. ss. |
| Pedras | 1951 | | 250 | | 11 | | | | | 41.0 | Cret. ss. |
| Pojuca Central | 1953 | | 4,700 | | 2 | | | | | 38.0 | Cret. ss. |
| Total Brazil | | | | 31 | 199 | | | 5,200 | 5,860,000 | | |

**BRAZIL REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Cia. de Petroleo da Amazonia, S.A.—Manaus | 5,000 | 2,500 | | |
| Destilaria Rio Grandense de Petroleo—Uruguaiana | 300 | | | |
| Industrias Matarazzo de Energia—Sao Paulo | 1,000 | | | |
| "Ipiranga" S.A. Rio Grande do Sul—Rio Grande | 6,000 | | 2,000 | |
| Refinaria de Manguinhos S.A.—Rio de Janeiro | 10,000 | | 7,000 | |
| Refinaria Uniao S.A.—Capuava | 20,000 | 10,000 | | |
| Petrobras S.A.—Mataripe | 15,000 | 7,200 | 2,500 | |
| Petrobras S.A.—Cubatao | 45,000 | | 18,000 | |
| Petrobras S.A. (Fabrica de Asfalto)—Cubatao | 3,500 | | | |
| Total Brazil | 105,800 | 19,700 | 29,500 | |

(1) Operated by "Ipiranga."

**CHILE PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Angostura | 1950 | | 7,500 | | | 1 | | | 5,169 | 46 | U. Cret. ss. |
| Chanarcillo | 1950 | | 7,600 | 3 | | | | 423 | 335,765 | 46 | U. Cret. ss. |
| Chanarcillo Sur | 1952 | | 7,500 | | | 1 | | 125 | 61,024 | 46 | U. Cret. ss. |
| Chillan | 1953 | | 7,600 | 5 | | 2 | 1 | 966 | 277,666 | 41 | Mio. sd., U. Cret. ss. |
| Cullen | 1954 | | 5,700 | 3 | | 5 | 1 | 577 | 85,904 | 40 | U. Cret. ss. |
| Delgada | 1951 | | 7,600 | | | 3 | | | 1,567 | 39 | U. Cret. ss. |
| Espora | 1949 | | 7,500 | | | 1 | | | 4,489 | 46 | U. Cret. ss. |
| Flamenco | 1954 | | 6,400 | | | 5 | 1 | | 8,608 | 40 | Altered volcanics |
| Manantiales | 1945 | | 7,500 | 10 | | 14 | | 386 | 1,107,607 | 42 | U. Cret. ss. |
| Manzano | 1953 | | 4,000-5,000 | | | 1 | | | | | Mio. sd. |
| Primavera | 1954 | | 7,600 | | | 1 | | | | | U. Cret. ss. |
| Punta Baja | 1952 | | 7,900 | | | 2 | | | 222 | | U. Cret. ss. |
| Sara | 1953 | | 7,700 | | | 1 | | | 382 | 46 | U. Cret. ss. |
| Side | 1953 | | 7,100 | | | 1 | | | 5,569 | 42 | U. Cret. ss. |
| Sombrero | 1950 | | 7,500 | 7 | | 9 | | 2,513 | 2,440,310 | 42 | U. Cret. ss. |
| Victoria Este | 1954 | | 7,500 | 1 | | 4 | | 291 | 163,551 | 46 | U. Cret. ss. |
| Victoria Norte | 1950 | | 7,600 | 1 | | 2 | | 185 | 257,655 | 42 | U. Cret. ss. |
| Victoria Oeste | 1954 | | 7,700 | | | 2 | 1 | | | | U. Cret. ss. |
| Victoria Sur | 1950 | | 7,500 | 4 | | 13 | 1 | 962 | 1,512,453 | | U. Cret. ss. |
| Total Chile | | | | 34 | | 68 | 5 | 6,428 | 6,267,941 | | |

**CHILE REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Empresa Nacional del Petroleo, Ramon Nieto N 920, Santiago—Concon | 20,000 | | 13,450 | |

(ENAP) contracted with American geologists, geophysicists, and drilling contractors to do its exploratory work. The initial production was discovered on the Manantiales structure in Tierra del Fuego on the extreme southern tip of Chile. All the country's production comes from this area, the most southerly producing region in the world today.

Chile's output from a series of small fields in this region jumped dramatically during the past year as ENAP kept six Santa Fe Drilling Co. rigs at work developing productive areas. Daily average production this year will be almost 7,000 bbl. compared to about 4,500 last year. Output from Chile's fields had reached 8,500 bbl. daily at the end of the year.

These fields will furnish about one-third of the throughput of the country's new 20,000 bbl. refinery at Concon, 12 miles north of Valparaiso. Half the crude charge will come from Venezuela's Oficina fields and the remainder from the Middle East. The refinery was built by M. W. Kellogg Co. and completed in 1954, but it was not formerly commissioned by President Carlos Ibanez until late in 1955 after it has operated for several months.

## Colombia . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **439,997** | **Value** | **$0.4020** |
| **Population** | **11,260,000** | **Refining cap., B/D** | **39,500** |
| **Capital** | **Bogota** | **Production, B/D** | **108,545** |
| **Currency** | **Peso** | **Producing wells** | **10** |
| | **Reserves, bbl.** | **580,000,000** | |

ONE of the major events in the Colombian oil industry this year was the opening of Velasquez field for commercial production.

The Texas Co. field, located on lands which the company holds in fee in Central Colombia, was opened after completion of a 113-mile, 12-in. pipeline to Galan, where the line joins the Andian National system. Foster Wheeler

**COLOMBIA** . . . opening of Velasquez field stirred oil hopes.

Corp. and Panama-Williams, Houston, built the line, which has a crude-throughput capacity of 30,000 bbl. daily. The field was discovered in 1947. Rapid development has gone on for the past 2 years. There are now at least 80 wells producing from lower Tertiary beds at around 8,000 ft.

Another important development this year was a contract award for the construction of a 25,000-bbl.-daily refinery near Cartagena on the Caribbean coast. Bechtel Corp. will build the $30,000,000 plant for International Petroleum (Colombia), Ltd. (Intercol), a Standard Oil Co. (N.J.) subsidiary.

The refinery was designed to fill products demands on Colombia's west coast. Construction was recommended 2 years ago in a government report, which also suggested private financing. At first, the government company, Empresa Colombiana de Petroleos, considered the venture, but Intercol offered to handle the project.

At present, Colombia's only large refinery is the newly modernized Barrancabermeja plant on the Magdalena River. Along with several scattered topping plants, the refinery serves the interior of the country. Refinery ownership reverted to the government after Intercol's de Mares concession expired in 1951. Intercol now operates the 37,250-bbl.-daily plant on a 10-year lease. The company had obtained the plant, together with producing fields and other facilities, shortly after World War I from the old Tropical Oil Co.

Five companies are producing crude at the present time in Colombia. Besides Intercol, Texas Petroleum, and the government company, there are Colombian Petroleum Co., which is jointly owned by Socony Mobil Oil Co., Inc., and The Texas Co., and a company in which Royal Dutch-Shell holds 60 per cent and Canadian Eagle Oil Co., Ltd., 40 per cent, Concesionaria de Petroleo Shell-Condor. Production this year has averaged around 110,000 bbl. daily. Output comes from two basins, Magdalena basin in northwest-central Colombia, and Maracaibo basin, across the frontier from Venezuela.

In a move to increase exploration incentives, the Colombian Government issued a decree in August which revised a decree announced in March. The new order divided Colombia into an eastern and western section. At the present time, all production comes from the western area. The new setup definitely favors work in the eastern section. The government's income on any new production developed in western Colombia will not be more than 50 per cent nor less than 40 per cent plus royalty. In the eastern section, on the other hand, there is no minimum share for the government and the ceiling has been set at 40 per cent. Concessions in eastern area have a duration of 50 years with a 20-year extension, against a 30-year life and a 10-year extension in the west. Royalty payments which ranged from 3 to 13 per cent were reduced to a flat 3 per cent for the eastern area. The tax on any pipelines built in the Llanos area was reduced from 4 to 2 per cent of income. For the rest of Colombia, the tax is 6 per cent.

In another decree this year, the government freed prices on several important products, including aviation and motor gasolines, special white fuel oil, asphalt paint, and asphalt. The decree applies for locally refined or imported products. Oil companies requested the removal of price controls on the grounds that an artificial structure would stunt the growth of the local oil industry and that increased competition made controls further unnecessary. The chief marketers are Intercol and Shell.

## Ecuador . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **175,830** | **Value** | **$0.0585** |
| **Population** | **3,080,000** | **Refining cap., B/D** | **6,050** |
| **Capital** | **Quito** | **Production, B/D** | **8,702** |
| **Currency** | **Sucre** | **Producing fields** | **5** |
| | **Reserves, bbl.** | **25,000,000** | |

ECUADOR'S dominant oil company, Anglo-Ecuadorian Oilfields, Ltd., negotiated a new contract with the government this year, and had a shift in ownership, not yet final, to two minority stockholders.

Under the agreement with the government, Anglo-Ecuadorian will build a new refinery by mid-1958 large enough to fill domestic demand for products. Terms covering the company's four development concessions were modified so that all concessions, totaling about 320 sq.

**COLOMBIA PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flow. & pump | Number of wells: Shut in | Number of wells: Midyear drilling | Prod. in bbl: July dly. avg. | Prod. in bbl: Accumulative to July 1 | °A.P.I. Gravity, data or prod. | Geological formation |
|---|---|---|---|---|---|---|---|---|---|---|
| Concession De Mares | 1930 | | 1,500-5,800 | 1,081 | 412 | | 31,925 | | 24.0 | |
| Concession Yondo | 1941 | | 2,100-5,600 | 388 | 8 | | 34,322 | | 21.1 | |
| Concession Barco | 1920 | | 700-5,300 | 308 | 113 | | 27,027 | | 31.9-46.8 | |
| Concession Dificil | 1943 | | 5,500-5,800 | 19 | 10 | | 1,380 | | 44.9 | Olig. ls. |
| Concession Cantagallo | 1942 | | 4,250-7,600 | 10 | 12 | | 2,547 | | 21.0 | Eoc. sd. |
| Concession Guaguaqui-Teran | 1946 | | 6,800-7,100 | 59 | 25 | | 8,002 | | 26.0 | Eoc. ss. |
| Concession Tetuan | 1949 | | 2,700 | 5 | 9 | | 1,064 | | 27.8 | Cret. ls., ss. |
| Concession Totumal | 1951 | | 8,000 | 3 | 7 | | | | 26.0 | Cret. ls., ss. |
| Concession Aguachica | | | | 4 | 5 | | 66 | | | |
| Concession San Pablo | | | | 16 | 2 | | 2,212 | | | |
| Total Colombia | | | | 1,893 | 603 | | 108,545 | 712,796,764 | | |

**COLOMBIA REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Colombian Petroleum Co., Apartado 100, Cucuta—Tibu | 2,000 | | | |
| Empresa Colombiana de Petroleos, Barrancabermeja—Barrancabermeja | 36,500 | 15,130 | 16,500 | A-1,400, I-450, Alky-1,255 |
| Texas Petroleum Co., Bogota—Guamo | 1,000 | | | |
| Total Colombia | 39,500 | 15,130 | 16,500 | |

**ECUADOR** **. . . dominant company makes new government contract.**

miles, will terminate in 1977. The company has an option for a 10-year extension. In the earlier agreement, termination dates ranged from 1971 to 1993.

Two firms holding minority interests sought to buy control of the company this year. They were South American Gold & Platinum Co., an American firm which holds about 10 per cent interest, and Lobitos Oilfields, Ltd., a British firm with operations in Peru and the U.K.

South American Gold & Platinum offered the board of directors $7 a share in September. Lobitos countered with an offer equivalent to $8.40 a share. A compromise plan offers stockholders the equivalent of $8.40 per share in cash and Lobitos stocks. The two firms will then divide the Anglo-Ecuadorian stocks 50-50. The plan is subject to formal approval by stockholders.

At the present time, Anglo-Ecuadorian handles 85 per cent, or more, of Ecuador's crude production, which averaged about 10,000 bbl. daily this year. The company has two small subsidiaries, Carolina Oil Co. and Petropolis Oil Co., and is operating contractor for a small local company, Concepcion Ecuadorian Oilfields. Production is from fields in Santa Elena Peninsula.

Manabi Exploration Co., Inc., in which Pantepec Oil Co., C.A., holds controlling interest, produces the remainder of Ecuadorian oil, which comes from the same peninsula. A Standard Oil Co. of California subsidiary has about 3,000 acres under concession in the coastal vicinity. Efforts to find oil in the interior of Ecuador have so far been unsuccessful. A $30,000,000 exploration program east of the Andes carried on from 1937 to 1950 by Royal Dutch-Shell, later joined by Standard Oil Co. (N. J.), failed to find commercial production.

Crude production exceeds domestic consumption by around one-third, but because demand for specific products differs from refinery yields, some imports are necessary. Anglo-Ecuadorian operates a refinery at La Libertad with a capacity of about 5,300 bbl. daily, including the throughput of a lubricating oil and asphalt plant used as a distillation unit. Manabi operates a 450-bbl.-daily topping plant.

The government maintains price controls over petroleum products. This year, prices were raised on kerosine, gas-diesel oils, and fuel oil for the first time since 1948. The basic selling price of gasoline, however, was held at the 1948 level, equivalent to about 10.8 cents per gallon. Gasoline accounts for about one-half of the total demand and about one-quarter of the supplies must be imported.

## Peru . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **514,059** | **Value** | **$0.0515** |
| **Population** | **8,560,000** | **Refining cap., B/D** | **47,500** |
| **Capital** | **Lima** | **Production, B/D** | **47,120** |
| **Currency** | **Sol** | **Producing wells** | **9** |
| | **Reserves, bbl.** | **225,000,000** | |

OIL exploration in Peru has shifted from the Sechura Desert, blighted by 16 dry holes, to the vast trans-Andean region known as the Oriente or Montana and its Amazon Basin.

Exploration on a big scale started in Peru less than 2 years ago when a more liberal oil law made the country more attractive to foreign capital. A dozen companies sought and received acreage in the Sechura Desert which looked doubly attractive because it was accessible to the coast. Since that time a succession of dry holes in the desert area has caused many of the companies to abandon their efforts and some have surrendered acreage entirely.

Now the emphasis is on the remote area of Peru

**ECUADOR PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Prod. in bbl.: Midyear drilling | July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ancon | 1921 | | 400-5,000 | | 1,175 | | 18 | 6,780 | 49,958,444 | 37-38 | Eoc. |
| Carolina Santa Paula | 1934 | | 700-3,000 | | 59 | | 1 | 529 | 1,656,995 | 27-28 | Eoc. |
| Cautivo-Tigre | 1920 | | 500-3,500 | | 154 | | 3 | 1,086 | 7,384,606 | 37-38 | Eoc. |
| Concepcion | 1931 | | 4,000 | | 24 | | | 130 | 1,307,226 | 37-38 | Eoc. |
| Petropolis and San Marcos | 1937 | | 2,500 | | 25 | | | 177 | 1,183,534 | 29.8 | Eoc. |
| Total Ecuador | | | | | 1,437 | | 22 | 8,702 | 61,490,805 | | |

**ECUADOR REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Anglo-Ecuadorian Oil Fields, Ltd., Casilla 410, Guayaquil—La Libertad, Santa Elena | 5,600 | | | |
| Manabi Exploration Co., Inc., Apartado 4075, Guayaquil—Santa Elena | 450 | | | |
| Total Ecuador | 6,050 | | | |

**PERU** **. . . exploration shifts to vast trans-Andean region.**

across the Andes. The government revealed recently that 16 foreign and Peruvian companies have been granted about 8 million hectares (19,860,000 acres) of exploration concessions and about 3½ million hectares (8,645,000 acres) have been applied for in the Montana. Exploitation concessions totaling nearly 57,000 hectares (140,790 acres) in the region have been granted by the government.

The only producing field in Peru's Amazon Basin is Agua Caliente with 16 producing wells and a daily output of about 2,000 bbl. of 43° paraffin-base crude. The field is operated by Ganzo Azul Cia. de Petroleo, owned 80 per cent by Texas Gulf Producing Co. with Kendall Refining Co., Bradford, Pa., and Bay Refining Corp., Saginaw, Mich., each owning 10 per cent. Ganzo Azul is building a 46-mile, 4-in. pipeline from its field to the Ucayali River port of Pucallpa and terminal facilities. The crude will be barged downriver by the Ucayali and then the Amazon to a refinery now under construction at Manaus, Brazil.

The remainder of Peru's production comes from the coastal region north of the Sechura Desert. Here the fields are produced by the government company, Empresa Petrolera Fiscal (E.P.F.), International Petroleum Co. (Jersey Standard), and Lobitos Oilfields, Ltd., a British-owned company. The fields are old and it has been by intensive drilling that the country's present production of about 47,600 bbl. daily has been kept on a rising market.

The country's internal consumption is rising steadily, gaining about 13 per cent a year and is now more than 35,000 bbl. daily. Fuel oil must be imported to meet the demand. The rapidly closing gap between production and consumption has led the government to encourage exploration in all parts of the country.

Companies holding the Montana concessions include Ganzo Azul; Texas Petroleum Co.; Cia. Peruana de Petroleo el Oriente; Cerro de Pasco Corp.; International Petroleum Co.; Peruvian Oils & Minerals, Ltd.; Richmond Oil Co.; Socony Mobil Oil Development Co. of Peru; Peruvian Pacific Petroleum Co.; Peruvian Gulf Oil Co.; Petroleo Sullana, Ltd.; Trans-Western de Peru, S.A.; and Skiles Oil Corp., Carmel, Ill.

Texas Petroleum Co. is drilling a test on a 2½-million-acre concession in the Maranon River Valley west of Iquitos. Texaco transported equipment for the test by LSM and barges up the Amazon from Brazil's Atlantic Coast to reach the location in Peru's interior.

The government company, E.P.F., is now operating a 1,200-bbl. topping plant at Iquitos, near the juncture of the Nanay and Amazon. The plant was rebuilt at this spot after being dismantled at Zorritos on the Pacific Coast and transported through the Panama Canal and up the Amazon River.

**PERU PRODUCTION[1]**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Agua Caliente | 1938 | | 1,200 | 4 | | | | 500 | 1,554,000 | | |
| Cope | 1938 | | 650 | | 6 | | | 20 | 164,000 | 34.6 | Mio. ss. |
| El Alto | 1910 | | 2,000 | 4 | 666 | 132 | | 6,500 | 113,747,500 | 38.0 | Eoc. sd. |
| La Brea Parenas | 1888 | | 3,000 | 200 | 1,700 | | | 29,300 | 362,500,000 | 36.6 | Eoc. sd. |
| Lobitos | 1902 | | 4,500 | 75 | 209 | 64 | | 7,900 | | 38.3 | Eoc. sd. |
| Los Organos | 1946 | | 1,500 | | 87 | 12 | | 1,500 | | 34.7 | Eoc. sd. |
| Organos | 1943 | | 2,000 | 5 | 62 | 3 | | 1,400 | 2,540,250 | 42.4 | Eoc. sd. |
| Punta Bravo | 1940 | | 2,400 | | 2 | | | | 5,000 | 36.2 | Eoc. sd. |
| Zorritos | 1863 | | 2,000 | | 33 | | | | 3,630,352 | 36.8 | Olig., Mio. sd. |
| Total Peru | | | | 288 | 2,765 | 211 | | 47,120 | 484,141,102 | | |

(1) Estimated.

**PERU REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Cia. de Petrole Ganso Azul, Ltd., Lima—Eastern Peru | 1,000 | | | |
| Empresa Petrolera Fiscal—Iquitos | 2,500 | | | (1) |
| International Petroleum Co., Ltd., Talara—Talara | 44,000 | | 15,200 | L-690, A-1,420, V-2,800 |
| Total Peru | 47,500 | | 15,200 | |

## World-Wide Oil Report

# Venezuela . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 352,150 | Value | $0.3003 |
| Population | 5,000,000 | Refining cap., B/D | 548,700 |
| Capital | Caracas | Production, B/D | 2,110,291 |
| Currency | Bolivar | Producing fields | 98 |
| | Reserves, bbl. | 12,000,000,000 | |

VENEZUELA is still the world's largest oil-exporting nation and the world's second largest oil producer. They are two positions the Latin-American country is not likely to relinquish, at least for a time, even to the often more dramatic Middle East's oil-producing countries.

The country is booming economically and it's a boom that's riding on a crest of oil. Venezuela's economy is so closely linked with oil and the consumption of heavy fuel oils in the United States that some observers have called her position dangerous. Dr. Humberto Cardenas Bacerra, head of Venezuela's income-tax department, revealed several months ago that oil provides 80 per cent of the country's income and enabled it to have a national budget of $800,000,000 this year. The country's income from oil is financing a huge public-works program that touches almost every phase of life in Venezuela. President Marcos Perez Jimenez revealed this month that his administration has spent more than a billion dollars on public-works projects in the past 3 years.

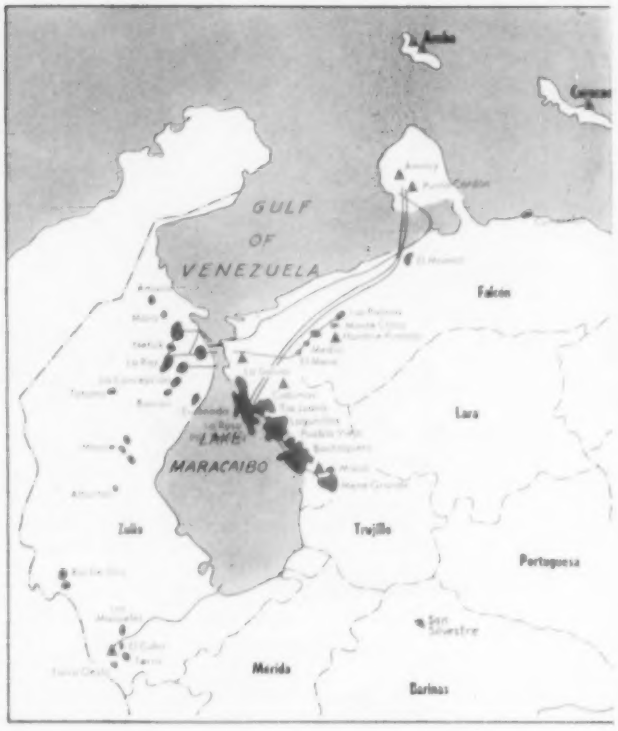
The country is now beginning to turn to other sources of mineral revenue, but it has been oil that has shown the way. Venezuelan mines are producing about 5 million tons of iron ore a year and most of it is being shipped to the United States. She is preparing to build her own steel mill with an initial capacity of 360,000 tons a year. Important deposits of manganese have recently been discovered in the country.

Because Venezuela's economy has been so closely linked with consumption in the United States, the country has been particularly vulnerable to agitation in this country for curbing imports of foreign oil. When Congress this year extended the Reciprocal Trade Act for another 3 years, it gave a new lift to Venezuela's already booming internal economy. The recent direction by Arthur Flemming, Defense Mobilization Director, that United States oil-importing companies must decrease imports from all areas except Venezuela and Canada also had a salutary effect on the country's oil industry.

### Production Rising Steadily

Some observers believe that as long as there is agitation in the United States to curb oil imports, Venezuela will hold off on any program to open new areas of the country for oil development. The country's production is rising steadily—about 250,000 bbl. daily more this year than last—but it is coming from an ever-shrinking concession acreage as the established companies relinquish 50 per cent of exploration acreage when they turn to development.

No new concessions have been granted in Venezuela for 10 years. The dozen companies which are operating in the country now would like to expand their operations and obtain new acreage. In addition there are at least half a dozen other major international oil companies which would like to enter Venezuela. A year ago in October, the government asked interested companies to submit proposals. Some governmental action that would increase geological and geophysical activity and bring on more intensified drilling in the country was expected in 1955. But, that was before the furor over imports broke out in the United States. The government has done nothing.




**VENEZUELA** . . . still second largest producer and exporter.

One of the big arguments for granting new concessions is the need for finding fields which produce a better gravity of crude in Venezuela. More than half the country's production is 25°-gravity crude or lower from the large fields of the Lake Maracaibo basin of western Venezuela. The number of rigs operating in Venezuela hasn't varied much in the past several years. The total number has been in the 100 to 110 range most of the time, but the emphasis has shifted slightly to the eastern part of the country in search of lighter crudes. At midyear there were 55 rigs operating in eastern Venezuela and 47 in the west. Another four were active in Barinas in the southwest.

In spite of the fact that all companies have operated on restricted acreage since the end of World War II, the three biggest producers in Venezuela had record budgets and plans for spending in the country last year. Creole Petroleum Corp.—Standard Oil Co. (N. J.)—which produces about 976,000 bbl. daily in the country, spent an estimated $120,000,000 in Venezuela this year. Creole has already said it will spend at least $180,000,000 expanding its operations during 1956, and that figure is regarded as conservative. Mene Grande Oil Co., controlled by Gulf Oil Corp., estimated it would spend $143,000,000 in Venezuela this year. Mene Grande produces about 314,000 bbl. daily. Cia. Shell de Venezuela had a 1955 budget of about $400,000,000. All three boosted production by sizable margins: Creole was up 16 per cent over last year's average; Shell up 7 per cent, and Mene Grande up 8 per cent.

Creole has completed and put into service one gas reinjection plant in Lake Maracaibo and has started construction on a second and larger gas-conservation unit. The first unit, built at a cost of $24,000,000, recycles about 137,000 M.c.f. daily with a planned ultimate ca-

## WESTERN VENEZUELA PRODUCTION

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl: July dly. avg. | Accumulative to July 1 | Gravity, A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **State of Barinas** | | | | | | | | | | | |
| Barinas | 1953 | | 8,500-9,000 | | | | 2 | 176 | 67,000 | 25.4 | Eoc.-Cret. |
| Silvestre | 1945 | | 8,888 | 1 | | 5 | 1 | 232 | 109,020 | 24.4 | Eoc.-Cret. |
| Total State of Barinas | | | | 1 | | 5 | 3 | 408 | 176,020 | | |
| **State of Trujillo** | | | | | | | | | | | |
| Motatan | 1938 | | 8,885 | 4 | | 1 | | 2,778 | 1,146,148 | 23.8 | Eoc. ss. |
| Total State of Trujillo | | | | 4 | | 1 | | 2,778 | 1,146,148 | | |
| **State of Falcon** | | | | | | | | | | | |
| Cumarebo | 1913 | | 1,968 | 42 | 12 | 17 | | 5,067 | 50,549,174 | 47.4 | Mio. ss. |
| Mamon | 1926 | | 3,350 | 2 | | 3 | 1 | 241 | 486,675 | 35.2 | Mio. ss. |
| Mene Mauroa | 1921 | | 600-1,850 | | 36 | 163 | 1 | 1,171 | 26,954,341 | 37.5 | Olig. ss. |
| Hombre Pintado | 1927 | | 1,000 | | 25 | 26 | | 433 | 5,619,257 | 24.2 | Olig. ss. |
| Tiguaje | 1953 | | 3,328 | 5 | | 3 | 1 | 668 | 296,688 | 27.6 | Eoc. ss. |
| Total State of Falcon | | | | 49 | 73 | 212 | 3 | 7,580 | 83,906,135 | | |
| **State of Zulia** | | | | | | | | | | | |
| Bachaquero | 1930 | | 3,444 | 180 | 939 | 558 | 6 | 331,289 | 529,654,036 | 12.7-16.5 | Mio., Eoc., Olig. ss. |
| Boscan | 1946 | | 6,500-7,500 | | 113 | 29 | 3 | 40,460 | 47,179,270 | 10.3-11.5 | Cret. Eoc. |
| Cabimas | 1917 | | 2,200 | 139 | 746 | 250 | 1 | 76,003 | 764,384,920 | 19.2-24.8 | Mio., Eoc., Olig. ss. |
| Concesiones Lacustres | 1947 | | 6,200-8,300 | 34 | | 11 | 4 | 37,337 | 13,516,314 | 31.7 | Mio., Paleo., Eoc. ss. |
| El Cubo | 1916 | | 984 | 43 | 95 | 58 | 2 | 19,957 | 144,328,646 | 37.7 | Eoc. ss. |
| Ensenada | 1948 | | 8,550 | 1 | | | | 131 | 459,352 | 57.2 | Cret.-Eoc. |
| La Concepcion | 1935 | | 3,100-8,000 | 12 | 68 | 16 | 2 | 13,138 | 49,543,511 | 36.6 | Cret.-Eoc. |
| Lagunillas | 1926 | | 3,000 | 339 | 1,459 | 458 | 6 | 494,489 | 2,569,120,063 | 14.8-25.7 | Mio., Olig., Eoc. ss. |
| La Paz | 1925 | | 4,200-8,000 | 55 | 27 | 32 | 1 | 99,508 | 424,410,914 | 33.3 | Eoc.-Cret. |
| Mara | 1945 | | 5,248 | 47 | | 33 | 4 | 98,139 | 208,468,369 | 29.5 | Cret. ss. |
| Mene Grande | 1914 | | 4,132 | 7 | 443 | 209 | 1 | 43,664 | 432,928,056 | 17.9 | Cret. ss. |
| Pueblo Viejo | 1940 | | 1,968 | 1 | 8 | 18 | 1 | 2,515 | 15,794,296 | 13.9-19.4 | Mio., Eoc., Olig. ss. |
| Sibucara | 1948 | | 13,451 | 4 | | 2 | 2 | 8,026 | 19,780,104 | 37.7 | Cret. ls. |
| Tia Juana | 1928 | | 3,000 | 184 | 631 | 448 | 2 | 210,604 | 968,731,235 | 12.6-24.8 | Mio., Eoc., Olig. ss. |
| Total State of Zulia | | | | 1,046 | 4,529 | 2,122 | 35 | 1,475,260 | 6,188,299,086 | | |
| Total Venezuela | | | | 3,508 | 5,356 | 3,602 | 89 | 2,110,291 | 8,376,357,861 | | |

pacity of 170,000 M.c.f. The second unit will be built on a 430 by 130-ft. platform resting on piling sunk into the lake floor. It will inject 300,000 M.c.f. of gas daily into the oil-bearing formations of the lake.

One of Shell's major Venezuelan projects has been completed. It is the integrated construction of more block stations in Lake Maracaibo for gathering crude from new wells and a pipeline to move it to a terminal. Lake-produced crude is pumped to a platform about 35 miles south of Maracaibo. From there the crude flows through a 19-mile section of 16-in. underwater line and a 27-mile, 24-in. land section to the Palmarejo terminal. The company is also adding cat cracking facilities to its Cardon refinery.

**EASTERN VENEZUELA PRODUCTION**
**State of Anzoategui**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | June drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Apamate | 1951 | | 6,670 | 1 | | 1 | | 122 | 326,162 | 43.5 | Olig., Mio., Eoc. ss. |
| Araibel | 1954 | | 10,516 | 1 | | 5 | 1 | 4,108 | 1,400,000 | 34.1 | Olig. ss. |
| Boca | 1951 | | 9,500 | 34 | | 28 | | 10,937 | 18,229,204 | 33-34.7 | Olig. ss. |
| Bruzual | 1954 | | 2,900 | | | 1 | | 6 | 2,240 | 40.3 | Mio. ss. |
| Cachama | 1952 | | 7,724 | | | 4 | | 64 | 192,520 | 34.7 | Olig.-Mio. |
| Caico Seco | 1946 | | 6,500-7,300 | 21 | | 16 | | 5,434 | 9,163,652 | 37.7 | Olig.-Mio. |
| Cascaroncito | 1953 | | 8,968 | | | 3 | | 29 | 21,068 | 44.0 | Olig.-Mio. |
| Cerro Pelado | 1951 | | 4,400 | 1 | | | 1 | 127 | 98,890 | 42.3 | Mio., Eoc., Olig. ss. |
| Chimire | 1948 | | 7,000-7,200 | 106 | | 65 | | 39,311 | 96,802,120 | 35-36.2 | Mio.-Olig. |
| Dacion | 1951 | | 6,700 | 83 | 6 | 12 | | 26,528 | 37,279,410 | 21-22.2 | Olig. ss. |
| El Roble | 1939 | | 3,500-11,500 | 25 | | 9 | | 4,395 | 26,593,785 | 44.3 | Mio., Eoc., Olig. ss. |
| El Toco | 1948 | | 9,000 | 18 | | 8 | | 3,545 | 8,620,544 | 41.5 | Olig.-Eoc. |
| Esquina | 1951 | | 4,300 | | | 2 | | 203 | 483,258 | 41.7 | Olig. ss. |
| Flecha | 1953 | | 5,736 | 3 | | 1 | | 566 | 204,900 | 40.0 | Mio. ss. |
| Fria | 1948 | | 6,500-7,300 | 9 | 3 | 7 | | 2,811 | 4,559,410 | 35.9 | Mio.-Olig. |
| Guara | 1942 | | 5,000-10,000 | 202 | 23 | 51 | 1 | 50,720 | 240,931,860 | 31.5-39.3 | Mio.-Olig. |
| Guario | 1940 | | 5,000-10,000 | 22 | | 24 | | 6,537 | 24,249,444 | 43.7 | Mio., Eoc., Olig. ss. |
| Guavinita | 1948 | | 3,500 | 5 | 5 | 4 | | 1,305 | 273,000 | 30.3 | Mio.-Olig. |
| Guere | 1951 | | 7,800 | 39 | | 20 | | 11,226 | 12,960,963 | 37.4 | Mio., Eoc., Olig. ss. |
| Guico | 1944 | | 4,500-7,000 | 39 | | 23 | | 6,805 | 44,498,824 | 31.4 | Mio.-Olig. |
| Inca | 1948 | | 7,100 | 3 | | 4 | | 230 | 585,086 | 36.3 | Mio.-Olig. |
| Isla | 1954 | | 5,400 | 1 | | 1 | | 435 | 286,066 | 40.4 | Mio. ss. |
| Junta | 1954 | | 6,720 | 8 | | 5 | | 2,370 | 1,025,536 | 22.8 | Olig. ss. |
| La Ceibita | 1953 | | 9,800 | | | 4 | | 902 | 643,746 | 35.2 | Eoc. ss. |
| La Vieja | 1951 | | 2,570 | 12 | | 6 | | 958 | 1,531,761 | 25.8 | Mio., Eoc., Olig. ss. |
| Las Adjuntas | 1954 | | 7,000 | 1 | | 2 | | 46 | 68,440 | 26.6 | Mio. ss. |
| Leona | 1938 | | 8,000 | 25 | 5 | 28 | 2 | 11,271 | 25,470,802 | 27.1 | Olig. ss. |
| Lobo | 1952 | | 6,400 | 6 | 1 | 2 | | 1,184 | 939,424 | 25.9 | Plio.-Mio. |
| Los Mangos | 1950 | | 7,740 | 2 | | 4 | | 343 | 124,000 | 38.4 | Mio. ss. |
| Mapiri Este | 1949 | | 9,500 | 7 | | 7 | | 4,356 | 10,529,336 | 34.7 | Mio. ss. |
| Mata | 1951 | | 11,520 | 28 | | 11 | 6 | 14,716 | 8,429,578 | 32.3-33.2 | Olig. ss. |
| Merey | 1937 | | 5,700 | 2 | 28 | 9 | | 4,440 | 3,725,787 | 15.4-17.1 | Mio.-Olig. |
| Nipa | 1945 | | 6,000-8,500 | 144 | | 66 | 5 | 52,504 | 79,465,956 | 34.1-38.0 | Mio.-Olig. |
| Oficina | 1937 | | 5,900 | 170 | 92 | 132 | 1 | 56,786 | 265,838,391 | 29.3-35.1 | Olig. ss. |
| Oscurote | 1953 | | 9,500 | 10 | | 9 | 1 | 7,485 | 2,783,719 | 31.9 | Mio.-Olig. |
| Palacio | 1946 | | 3,440 | 28 | 28 | 16 | | 4,896 | 1,750,254 | 30.4 | Mio.-Olig. |
| Pradera | 1951 | | 6,400 | | | 4 | | 483 | 668,174 | 41.9 | Mio.-Olig. |
| Quiamare | 1942 | | 5,900-6,600 | 19 | | 5 | | 4,816 | 5,025,088 | 41.7 | Mio.-Olig. |
| Rincon Largo | 1941 | | 6,500-8,500 | 4 | | 4 | | 1,059 | 6,709,196 | 46.3 | Mio., Eoc., Olig. ss. |
| San Joaquin | 1939 | | 6,500 | 49 | | 26 | 1 | 9,388 | 14,763,528 | 44.8 | Mio., Eoc., Olig. ss. |
| San Roque | 1949 | | 8,500 | 24 | | 8 | 1 | 2,394 | 11,798,464 | 48.7 | Mio., Eoc., Olig. ss. |
| Santa Ana | 1936 | | 8,500 | 37 | | 16 | 2 | 14,139 | 25,280,116 | 36.4 | Mio., Eoc., Olig. ss. |
| Santa Fe | 1953 | | 11,500 | | | 1 | | 143 | 148,178 | 42.3 | Olig. ss. |
| Santa Rosa | 1941 | | 8,500 | 40 | | 13 | 4 | 15,386 | 21,882,892 | 44.1 | Mio., Eoc., Olig. ss. |
| Soto | 1949 | | 9,500 | 90 | | 58 | 1 | 33,309 | 43,838,931 | 35.5 | Mio.-Olig. |
| Tacata | 1946 | | 2,210 | 1 | | | | 196 | 246,888 | 37.4 | Mio. ss. |
| Tapuco | 1952 | | 10,100 | 9 | | 10 | | 5,291 | 5,802,356 | 32.2 | Mio.-Olig. |
| Yopales | 1937 | | 4,600 | 11 | 4 | 26 | 1 | 3,872 | 9,974,793 | 23.8 | Mio.-Olig. |
| Zeta | 1954 | | 10,700 | 35 | | | 4 | 18,414 | 7,383,038 | 32.3 | Mio. ss. |
| Total Anzoategui | | | | 1,375 | 195 | 761 | 32 | 446,591 | 1,083,610,778 | | |
| **Federal Territory of Delta Amacuro** | | | | | | | | | | | |
| Pedernales | 1933 | | 1,571 | 18 | | 8 | | 10,060 | 34,221,138 | 21.1 | Mio. ss. |
| Tucupita | 1945 | | 5,600 | 37 | | 2 | | 8,032 | 23,434,529 | 16.5-17.1 | Mio.-Olig. |
| Total Territory of Delta Amacuro | | | | 55 | | 10 | | 18,092 | 57,655,667 | | |

(Continued on Next Page)

## EASTERN VENEZUELA PRODUCTION (Continued)

### State of Guarico

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | June drilling | Prod. in bbl.: July dly. avg. | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Aragua | 1950 | | 7,500-8,822 | 14 | | 7 | | 1,795 | 649,861 | 53.5 | Mio., Eoc., Olig. ss. |
| Belen | 1954 | | 4,650 | | | 1 | | 3 | 1,656 | 32.0 | Mio.-Olig. |
| Bella Vista | 1952 | | 2,900-4,600 | 49 | 4 | | 1 | 3,052 | 2,078,736 | 31.9 | Olig. ss. |
| Dakoa | 1951 | | 3,500-5,700 | 6 | | 2 | | 337 | 142,282 | 31.3 | Mio.-Olig. |
| Grico | 1946 | | 400-4,800 | 1 | | | | 130 | 94,876 | 29.4 | Cret. ss. |
| Las Mercedes | 1942 | | 4,500 | 133 | 20 | 56 | 4 | 17,875 | 53,860,686 | 32.0 | Mio., Eoc., Olig. ss. |
| Piragua | 1949 | | 3,400 | 3 | | 1 | | 146 | 53,758 | 36.8 | Mio.-Olig. |
| Punzon | 1946 | | 4,400 | | | 1 | | 62 | 261,024 | 36.8 | Mio., Eoc., Olig. ss. |
| Ruiz | 1949 | | 4,450 | 60 | 1 | 8 | | 6,664 | 15,544,824 | 31.8 | Mio., Eoc., Olig. ss. |
| Saban | 1947 | | 2,600 | 36 | 13 | 20 | 1 | 5,807 | 7,868,189 | 36.8 | Mio., Eoc., Olig. ss. |
| Taman | 1949 | | 5,200 | 3 | 13 | 1 | | 2,066 | 9,645,609 | 38.7 | Mio., Eoc., Olig. ss. |
| Tucipido | 1947 | | 2,800-5,600 | 17 | 5 | 12 | | 2,466 | 12,847,108 | 39.0 | Mio., Eoc., Olig. ss. |
| Total State of Guarico | | | | 322 | 56 | 109 | 6 | 40,403 | 103,048,609 | | |

### State of Monagas

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Coporo | 1954 | | 5,746 | | | 2 | | 2 | 472 | 35.1 | Eoc.-Olig. |
| Jusepin | 1938 | | 3,000-5,300 | 181 | 8 | 168 | | 15,485 | 157,146,804 | 31.9 | Mio.-Olig. |
| Manrosa | 1954 | | 2,600 | 1 | 2 | | 2 | 36 | 12,376 | 17.9 | Mio., Plio., Cret. ss. |
| Mata Grande | 1946 | | 4,700 | 27 | | 13 | 1 | 1,641 | 4,332,458 | 27.9 | Olig.-Mio. |
| Mulata | 1941 | | 3,500-11,500 | 140 | 2 | 51 | | 9,193 | 78,042,246 | 36.5 | Mio.-Olig. |
| Muri | 1942 | | 4,500 | 34 | 2 | 19 | | 896 | 14,404,209 | 27.1 | Mio. ss. |
| Oritupano | 1954 | | 7,650 | 3 | | | 2 | 278 | 98,250 | 25.6 | Olig. ss. |
| Orocual | 1933 | | 2,954 | 3 | | 7 | 1 | 796 | 341,966 | 24.2 | Plio. ss. |
| Quiriquire | 1928 | | 6,500-8,000 | 2 | 479 | 42 | 1 | 67,027 | 468,578,534 | 16.2 | Plio. ss. |
| Santa Barbara | 1941 | | 5,000-6,500 | 186 | 2 | 47 | 3 | 15,033 | 86,118,606 | 32.2-34.5 | Mio.-Olig. |
| Tacat | 1953 | | 1,800-3,670 | 12 | | 4 | | 164 | 78,768 | 19.8 | Mio. ss. |
| Temblador | 1936 | | 3,500-4,500 | 67 | | 29 | | 8,469 | 48,086,409 | 20.4-21.3 | Mio.-Olig. |
| Travieso | 1944 | | 4,000 | | 8 | | | 159 | 1,274,320 | 27.4 | Mio. ss. |
| Total State of Monagas | | | | 656 | 503 | 382 | 10 | 119,179 | 858,515,418 | | |

## VENEZUELA REFINING

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Compania Shell de Venezuela, Ltd., Apartado 809, Caracas: | | | | |
| Puerto Cardon | 145,000 | (1) | 32,600 | P-1,500, L-2,900, V-16,000 |
| San Lorenzo | 45,000 | | | |
| Colon Development Co., Ltd., Apartado 809, Caracas: | | | | |
| Casigua | 1,000 | | | |
| Calvario | 300 | | | |
| La Rivera | 300 | | | |
| Creole Petroleum Corp., Edificio "Creole" Los Chaguaramos, Apartado 889, Caracas: | | | | |
| Amuay | (2)178,000 | | | V-100,000, R-7,500 |
| Caripito | 73,000 | | 35,000 | |
| Phillips Petroleum Co., Edificio Republica, Peligro a Puente Republica, Apartado 1031, Caracas—San Roque | 2,100 | | | |
| Richmond Exploration Co., Caracas—Bajo Grande | (3) | | | |
| Sinclair Oil & Refining Co., Caracas—Puerto La Cruz | 35,000 | | 12,000 | |
| Texas Petroleum Co., Edificio "Karam," Pelota a Ibarras, Caracas—Tucupita | 10,000 | | | |
| Venezuelan Gulf Refining Co., Edificio "Vulcania," Caracas—La Cruz | 59,000 | (4) | 12,000 | |
| Total Venezuela | 548,700 | | 91,600 | |

(1) Cat cracker of 35,000-bbl. capacity planned. 60,000-bbl. vacuum unit also planned. (2) Atmospheric distillation unit of 100,000-bbl. capacity to be added in 1956. (3) 10,000-bbl. refinery to be built. (4) 14,500-bbl. visbreaker to be added. 8,650-bbl. cat cracker planned.

Sinclair Oil Corp.'s Venezuelan Petroleum Co., the eighth ranking producer in the country, has contributed two of the more dramatic exploration developments in Venezuela in recent years. The company's production jumped about 19 per cent during the past year and is now more than 24,000 bbl. daily. The company has estimated that at least 66,000,000 bbl. of recoverable oil lies beneath its Barinas concession and drilling to determine the extent of the field is still going on. The discovery, Sinco 1, was made in 1953. Since that time, the company has drilled three more producers and an equal number of dry holes. Sinco 1 was completed for about 1,300 bbl. daily of 25°-27° crude from two productive zones. The field is some 240 miles from tidewater and it has been estimated that it would cost $25,000,000 to build a pipeline to market the crude.

Another Sinclair discovery was in Monagas where the company's Aguasay 1 opened a new pool northeast of

Greater Oficina field. Production comes from the same Oligocene section of sands found in other Greater Oficina areas, but they are 500 to 1,000 ft. thicker. The discovery flowed from 720 to 1,000 bbl. daily on tests of the lower of two formations and at about 800 bbl. daily from the upper zone. The upper zone is 11,994-12,032 ft. and the lower at 12,495-12,500 ft. The new productive area is about 35 miles southwest of the company's Santa Barbara field discovered in February 1954 and now being developed.

Creole this year completed Venezuela's first open storage pit at a cost of more than $1,000,000. The earthen pit covers nearly 30 acres, is 5 ft. deep, and encircled by a 30-ft. dike. It will hold 3,500,000 bbl. of crude at a cost of about 30 cents a barrel. The facility was scooped out near Amuay after tests on the clay soil revealed it would hold the crude. Creole also got under way late this year with its project to enlarge the La Salina terminal in Lake Maracaibo to handle all the company's production in the area. This project was fostered by a $7,000,000 construction job on the Maracaibo ship channel to open it for ocean-going tanker travel. It involves building a 2¼-mile-long breakwater about 3,000 ft. east of the channel and parallel to it. The breakwater, 100 ft. wide at its base and 24 ft. wide at the top, extends 10 ft. above high tide. It is now being completed by Empresas Campanon Bernard, French construction firm, and is designed to keep the channel from silting up.

Creole has also introduced the first catalytic reforming unit to Venezuela. A 10,000-bbl.-daily fluid Hydroformer at Creole's Amuay refinery is a part of the company's general improvement program for the plant. The reformate output is being used for aviation gasoline in Venezuela, for blending to upgrade Venezuela's premium motor gasoline, and for export to the Aruba refinery of Lago Oil & Transport, Ltd., for use in making 110-115-grade aviation gasoline.

# Trinidad . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 1,864 | Value | $0.59 |
| Population | 615,000 | Refining cap., B/D | 115,000 |
| Capital | Port-of-Spain | Production, B/D | 66,310 |
| Currency | Dollar | Producing fields | 12 |
| | Reserves, bbl. | 280,000,000 | |

THE offshore well in the Gulf of Paria was a main point of interest in Trinidad this year. The High Seas well was the first major offshore effort to find new reserves needed for the long-range health of the island's oil industry. It was drilled by Trinidad Northern Areas, Ltd., which is jointly owned by Trinidad Leaseholds, Ltd., United British Oilfields of Trinidad, Ltd. (Royal Dutch-Shell), and D'Arcy Exploration Co., Ltd. (British Petroleum Co.) Started in July 1954 off the southwest corner of Trinidad, the well struck a horizon this year which at first produced around 160 bbl. daily. These sands had to be abandoned because of water encroachment. Tests were then undertaken on sands at a higher level where some water-free oil was obtained.

The well focused attention on the high cost of offshore drilling. T.N.A. asked the government for tax relief and said plans for further development would be postponed until a percentage depletion allowance for marine operations was decided upon. In September, a second company began offshore work in the gulf. Antilles Petroleum Co. (Trinidad) Ltd., a subsidiary of McColl-Frontenac Oil Co. Ltd., which is controlled by The Texas Co., towed in a barge from Texas. It is believed to be the first submersible drilling barge used in South America.

Crude production was at a record level this year. Daily output hovered around the 67,000-bbl.-daily mark, up about 4 per cent over 1954. The development of existing fields was continued by successful stepouts. A half-year report by the Petroleum Association showed that an

**TRINIDAD PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Brighton-Vessigny | 1908 | | 700-4,600 | | | | | 2,843 | | 16-38 | Olig. sd. |
| Forest Reserve-Apex-San Francique | 1913 | | 100-8,000 | | | | | 26,100 | | 15-33 | Mio. sd. |
| Guayaguayare | 1902 | | 500-6,000 | | | | | 1,908 | | 15-49 | Mio. sd. |
| Kern-Parrylands-Cruse | 1913 | | 2,000-4,000 | | | | | 8,554 | | 13-30 | Mio. sd. |
| Palo Seco-Los Bajos | 1926 | | 460-6,400 | | | | | 4,598 | | 16-33 | Mio. sd. |
| Penal-Barrackpore | 1918 | | 500-10,000 | | | | | 9,517 | | 11-35 | Olig. sd. |
| Point Fortin-Point Ligoure | 1908 | | 1,000-7,800 | | | | | 5,635 | | 15-45 | Mio. sd. |
| Quarry-Coora-Quinam-Morne Diablo | 1936 | | 280-6,480 | | | | | 6,031 | | 16-30 | Olig. sd. |
| Moruga | 1953 | | | | | | | 71 | | 11-30 | Mio. sd. |
| Balata | 1952 | | | | | | | 572 | | 29-35 | Olig. sd. |
| Cats Hill | 1953 | | | | | | | 406 | | 36-46 | Mio. sd. |
| Oropouche | 1954 | | | | | | | 75 | | 35.0 | Olig. sd. |
| Total Trinidad | | | | 844 | 1,857 | | 20 | 66,310 | (1)497,000,000 | | |

(1) Estimated.

**TRINIDAD REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Brighton Terminal, Ltd., 30 Rockefeller Plaza, New York—La Brea | 5,000 | | | |
| Trinidad Leaseholds, Ltd., Trinidad House, 29-30 Old Burlington St., London, W. 1—Pointe-a-Pierre | 80,000 | 15,000 | 35,000 | V-30,000, P-150, Alky-1,100 |
| United British Oilfields of Trinidad, Ltd., 15 Ambercrombay Street, Port of Spain—Point Fortin | 30,000 | | | |
| Total Trinidad | 115,000 | 15,000 | 35,000 | |

average of 25 rigs were in use the first 6 months of 1955. Of 110 new wells started in this period, 95 were completed as producers. Nine wells were abandoned as dry holes and three for technical causes. Aggregate depth of the new producers is 431,650 ft. Nine old wells were abandoned the first half, and 85 were recompleted. In Palo Seco field, Trinidad Petroleum Development Co., Ltd., and Trinidad Leaseholds were developing an important northwest extension. In October 1954, U.B.O.T. made one of the year's most important discoveries. A new pool in the Cats Hill Miocene field had an initial production of 522 bbl. daily of 46.3°-A.P.I.-gravity crude. Small production also comes from underwater zones tapped by deviated wells drilled from shore.

Gas production during the first 6 months totaled 19,281,519 M.c.f. A large part of the gas was utilized, including 8,517,870 M.c.f. used as fuel, and 2,590,596 M.c.f. returned to formations.

Other crude-producing companies in Trinidad include Apex (Trinidad) Oilfields, Ltd.; Kern Trinidad Leaseholds, Ltd.; and Trinidad Central Oilfields, Ltd. A Standard Oil Co. of California company, Dominion Oil, Ltd., is exploring in the central part of the northern basin. The largest of Trinidad's three refineries is Trinidad Leasehold's plant at Pointe-a-Pierre. This plant accounts for 80,000 bbl. daily out of the islands' total refinery capacity of 115,000 bbl. daily.

## Uruguay . . .

IN AN effort to find Uruguay's first oil production, the government organization, Administracion Nacional de Combustibles, Alcohol y Portland (A.N.C.A.P.), has contracted for six wells to be drilled within 2 years. Dunlap & Graham are doing the work, using a diesel rig capable of drilling to 10,000 ft. A.N.C.A.P. can buy the rig at any time under the arrangement. Three wells were expected to be drilled in northern Uruguay. At least one test was to be made at Santa Lucia, about 30 miles north of Montevideo, where oil shows were found last year at about 3,600 ft. in a water well. Geologic work for A.N.C.A.P. has been done by De Golyer & MacNaughton.

Crude-oil and alcohol refining in Uruguay are handled by A.N.C.A.P., which holds a government-granted monopoly. Demand for most products is filled by the 28,000-bbl. refinery at La Teja on Montevideo Bay. To meet growing consumption, a refinery-expansion program is planned, the first part of which is due for completion in 1957. At that time, a new topping unit, vacuum unit, and catalytic cracker are expected to be ready. A lubricating-oil plant is planned as the second phase of new construction. Last year, Venezuela supplied more than half the crude imported by Uruguay. Saudi Arabia, Chile, Ecuador, and Peru were the next ranking suppliers.

URUGUAY REFINING

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Refineria ANCAP, Casilla de Correo, P.O. Box 1090, Montevideo—La Teja | (1) 28,000 | 5,000 | (2) 2,000 | A-350, V-750 |

(1) Additional 28,000 bbl. planned. 10,000 additional vacuum planned. Asphalt capacity to be increased by 750 bbl. daily. (2) Cracking plant which operates as an atmospheric unit.

# CENTRAL AMERICA AND CARIBBEAN AREA

## Cuba . . .

| | | | |
|---|---|---|---|
| **Area, sq. miles** | **44,206** | **Value** | **$1.00** |
| **Population** | **5,470,000** | **Refining cap., B/D** | **7,700** |
| **Capital** | **Havana** | **Production, B/D** | **970** |
| **Currency** | **Peso** | **Producing fields** | **4** |
| | **Reserves, bbl.** | **3,000,000** | |

CUBA is in the midst of its biggest oil boom in the island's history. More than a dozen companies are in Cuba, some of them with large-scale exploration programs under way and about $25,000,000 committed to the search for oil.

Almost the entire 28,000,000-acre area of the island as well as several million acres of Cuba's shallow offshore areas is covered by exploration concessions. Late in the year there were 9 rotary rigs and 20 cable-tool rigs running on the island. Daily production is only about 1,900 bbl. daily, but that's eight times what it was a year ago.

The spark that gave Cuba a real oil fever came in May 1954, when a Kerr-McGee Oil Industries, Inc., drilling crew operating a government-owned rig for Cuban independents brought in Echevarria 1. The well, 3 miles north of Jatibonico, flowed 192 bbl. of 15° gravity oil from 1,072-88 ft. Since then Kermac has exercised an option to acquire 25 per cent of the operation and has undertaken orderly development of the field. The field now has 17 producers, owned by 3 companies, and produced about 1,200 bbl. daily in October. The average daily production from Jatibonico field for the first 10 months of the year was about 740 bbl. daily.

CUBA PRODUCTION

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bacuranao | | | 400 | | | | | 100 | 196,000 | 22-30 | |
| Jarahueca | 1943 | | 1,250 | | | | | 70 | 1,321,590 | 15-17 | L. Cret. |
| Jatibonico | 1954 | | 8,360 | | | | | 800 | | 37-39 | Sed. tuff |
| Motembo | 1880 | | 1,250 | | | | | (1) | 2,200,000 | 62.0 | L. Cret. |
| Total Cuba | | | | | | | | 970 | 3,717,590 | | |

(1) Distillate field.

## World-Wide Oil Report

The biggest single shot in the arm which the Cuban play has had was the entry of Stanolind Oil & Gas Co., a subsidiary of Standard Oil Co. (Ind.). Stanolind signed a deal with Cia. Petrolera Trans Cuba, S. A. and Cuban-Venezuelan Oil Voting Trust for a half-interest in 12 million acres of concessions they hold. Stanolind plans to spend $10,000,000 over the next 5 years exploring areas scattered over most of the island and offshore areas off the southern coast.

Stanolind must spend at least $2,000,000 on the program by January 1957 and another $2,000,000 each succeeding year, or drill 40,000 ft. of exploratory hole to keep its half interest alive. The company is gambling heavily on the thick Tertiary basins along the southern coast. A dozen blocks in the concessions are scattered over Matansas, Las Villas, Camaguey, Havana, and Oriente provinces and their offshore areas.

Two other majors, Royal Dutch-Shell and Jersey Standard, have been active in Cuba at intervals since 1932. The two joined Canadian Eagle in 1936 in a program of structural hole drilling in the western Colon basin and 3 years later they drilled two dry holes in the Ariguanabo uplift. Since 1952 the combine has confined itself to seismic work, but may do more deep drilling if seismic surveys warrant.

At least a dozen more companies are active in Cuba, most of them American independents and Cubans. They include Siboney Development & Exploration Co. (Crescent Corp.-Sterling Oil of Oklahoma, Inc.), Pacific Petroleums, Ltd., C. J. Simpson Drilling Co., Cuban American Drilling & Exploration Co., Cuban Kewanee Oil Co., Jones Oil Enterprises of Cuba, Russell Cobb, Jr. and Mike Benedum, and Cullen Minerals Corp.

One big reason for the Cuban boom is the country's oil law. It was liberalized in mid-1954 to give substantial exemption from the graduated profits tax to companies willing to spend large amounts of money.

If the country should become a major oil producer it will have no refining difficulties. The country has about 8,000 bbl. daily in refining capacity and three major refining construction programs are already under way.

Esso Standard Oil Co., S.A., will expand its 6,500-bbl.-daily refinery at Belot to 30,000 bbl. daily or more. Cia. Petrolera Shell de Cuba is building a new refinery on a 130-acre Havana Bay site that will have an initial capacity of 25,000 bbl. daily. At the opposite end of the island, The Texas Co. started construction in November on a 20,000-bbl.-daily refinery 3 miles south of Santiago de Cuba. All three will operate on imported crude.

Two other refineries on the island are operated by Cuban interests. One at Cabaiguan has a throughput capacity of about 1,000 bbl. daily and the other at Jarahueca processed about 200 bbl. daily.

**Barbados . . .** Gulf Exploration Co. is testing below 10,000 ft. in 1 Springvale, the fourth test it has drilled on this British island since obtaining a concession in 1950 covering about half the island's 166-sq.-mile area. 1 Springvale is in the mountainous area known as Scotland near the center of the island on the northeast side. Gulf first test in the Turner Hall area in the northwest section of the island produced small amounts of gas and was shut in. Two other tests proved to be unsuccessful.

**Guatemala . . .** Guatemala, a closed country since 1949, has attracted 29 companies who filed 92 applications for exploration acreage under its new oil legislation.

Left-wing elements of the country passed a highly restrictive law in 1949 that effectively barred foreign capital for exploration. That left wing government was overthrown in September 1954 and one of the first acts of Castillo Armas, the new president, was a more liberal oil law. Before 1956 is over Guatemala could be reaping the benefits of the law.

Most of the 29 applications filed in November were for areas in northern Guatemala in Peten province. Rep-

**CUBA REFINING**[1]

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Esso Standard Oil Co., S.A., P.O. Box 1303, Havana—Belot | [2]6,500 | | 2,400 | |
| Petrolea Jarahueca, S.A.—Jarahueca | 200 | | | |
| Refinadora Cabaiguan, S.A.—Cabaiguan | 1,000 | | | |
| Total Cuba | 7,700 | | 2,400 | |

(1) The Texas Co. and Shell Oil Co. have both announced plans to build refineries in Cuba. Shell's will be about 30,000 bbl., Texaco's about 20,000 bbl. (2) Esso plans to add an additional 24,000 bbl. to the Belot refinery.

**PUERTO RICO REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Caribbean Refining Co., San Juan—San Juan | 10,500 | 5,000 | | V-6,800, P-500 |
| Commonwealth Oil Refining Co., Inc., San Juan—Guayanilla | (1) | | | |
| Total Puerto Rico | 10,500 | 5,000 | | |

(1) Company building a 23,500-bbl. capacity refinery.

**NETHERLANDS WEST INDIES REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Lago Oil & Transport Co., Ltd., Aruba—Aruba | 440,000 | 43,000 | 340,000 | V-20,500, Alky-5,300 |
| N.V. Curacaosche Petroleum Industrie Maatschappij, The Hague—Curacao | 200,000 | | 118,000 | |
| Total N.W.I. | 640,000 | 43,000 | 458,000 | |

resentatives of the filing companies are now trying to compromise the overlapping applications. If they cannot do so, the government will settle disputed areas by granting them to the highest bidder.

The country is not new to oil men from a geographical standpoint. Before the passage of the communist-inspired restrictive law in 1949, Standard Oil Co. of Ohio, Ohio Oil Co., and Atlantic Refining Co. all did exploration work in the country. Standard Oil Co. (N.J.) did work in the country as early as 1925 and Shell did geological work there 10 years later.

Most companies concede that exploration work in Guatemala under the new oil legislation is going to be an expensive process. Elmer Batzell, Washington petroleum consultant to the Guatemalan Government, has estimated that $25,000,000 to $30,000,000 will be spent in the country. The most promising region is the province of Peten, about the northern one-third of the country. It's rugged country with no roads and only one small port of entry for transporting heavy drilling equipment that will be used.

**Costa Rica . . .** Cia. Petrolera de Costa Rica, Ltd., subsidiary of Union Oil Co. of California, is drilling its third test of a three-well exploratory program in Costa Rica. The first two wells drilled during 1955 were dry.

The area being tested is in southeastern Costa Rica near the Panama border near the village of Puerto Viejo on the Caribbean. It is the same general area where Sinclair drilled an unsuccessful test several years ago.

The first test was taken to 6,754 ft. with a National 75 rig of Loffland Brothers in the southern part of Limon Province on the Atlantic side of the country. The second was in the same area. The company's concession agreement with the Costa Rican Government calls for at least three wells in a 4-year program in which the firm agreed to spend a minimum of $100,000 a year.

**British Honduras . . .** British Honduras Gulf Oil Co., a wholly-owned subsidiary of Gulf Oil, is drilling below 6,000 ft. in a wildcat in western British Honduras that is projected to 10,000 ft. The well was spudded in June by Santa Fe Overseas Drilling Co. in the Yalbac area about 65 miles west of Belize. Gulf has done more than 3 years exploration work in the country and has an exploration concession for the entire 12,000 sq. miles in British Honduras.

**Puerto Rico . . .** Puerto Rico's first refinery near San Juan went into operation last May and within 5 months Caribbean Refining Co. said the plant was producing about 13,000 bbl. daily of products, or 2,500 bbl. daily over its rated capacity.

The refinery was built by Fluor Corp. with process units all of UOP design. It is operating on eastern Venezuelan crude hauled to new docking facilities only 2 miles from the refinery site and then moved by pipeline. Owners of the refining company are Gulf Oil Corp.; J. H. Whitney & Co., New York investment bankers; Pontiac Refining Co.; Cosden Petroleum Corp.; Ferre Industries, Puerto Rico; Emby Kaye, Tulsa consultant; and Byllesby & Co., New York underwriting firm.

A second new 23,500-bbl. daily refinery being built for Commonwealth Oil Refining Co., Inc., will go on stream early next year at Guayanilla Bay on Puerto Rico's south coast.

**Haiti . . .** Commonwealth Oil Co. is drilling its first test in the Republic of Haiti under an exclusive 50-year concession covering the entire country that was granted this year. The first well is going down on Ile de la Gonave, an island in the Gulf of Gonaives about 32 miles north of Port-au-Prince. It is projected to 7,000 ft.

**Netherlands West Indies . . .** The islands of Aruba and Curacao have the world's largest export refining industries. Largo Oil & Transport Co., Ltd., (Standard Oil Co. (N.J.)) operates a 440,000-bbl. daily refinery on Aruba and N. V. Curacaosche Petroleum Industries Mij. (Royal Dutch-Shell) has a 200,000-bbl. daily refinery on Curacao. Both operate on crude from nearby Venezuela.

# AFRICA

## Egypt . . .

| | | | |
|---|---|---|---|
| Area, sq. miles | 386,000 | Value | $2.8825 |
| Population | 20,800,000 | Refining cap., B/D | 49,000 |
| Capital | Cairo | Production, B/D | 34,008 |
| Currency | Pound | Producing fields | 8 |
| | Reserves, bbl. | 150,000,000 | |

TWO new producing fields, a major Western Desert exploration program, and a government refinery-construction program have injected new life into an Egyptian oil industry that was on the downgrade until this year.

In addition to these new developments, there have been persistent reports from Egypt in recent months that the two older operating companies in the country, Anglo-Egyptian Oilfields, Ltd., (Royal Dutch-Shell) and Socony Mobil Oil Co., have reached agreement with the government settling the 7-year-old dispute which has halted exploratory work by the two. There were similar reports a year ago. Officials of the two companies concede that agreement in principles has been reached but nothing has been signed.

Anglo-Egyptian has applied for 160 new exploration licenses, 22 of them for marine locations and the remainder in the northeastern area of the Nile Delta which has not been explored. The company has also increased the production of its Ras Gharib field on the west side of the Gulf of Suez by additional development drilling in the 17-year-old field.

Egypt's oil production, which jumped up with the development of Asl and Sudr after World War II, began to fall back rapidly 2 years ago as the fields began to decline. The postwar average daily production of about 46,000 bbl. daily had dropped to an average of 37,800 bbl. daily in 1954. During the first 9 months of this year, the average had dropped to about 33,400 bb. daily, but it was rising at the end of the year.

The year-end rise came from two new fields on the Sinai Peninsula being rapidly developed by International Egyptian Oil Co., Inc., with Southern California Petroleum Corp. acting as operator for the other interests. International Egyptian was formed by the Swiss Interhandel and Hofman Bank group originally. Since that time the Belgian company, Cie. Financiere des Petroles (Petrofina) and the Italian government company, Azienda Generale

Italiana Petroli (AGIP) acquired interests of 20 per cent each.

The company obtained rights from the government over an area which included the Wadi Feiran discovery made in 1949 by Standard Oil Co. of Egypt (Jersey Standard). The Jersey affiliate abandoned its Egyptian exploratory operations because of what it regarded as an unfavorable legal situation and its equipment was sold to International Egyptian.

The company now has four wells producing in the Feiran field and six more in a newer and larger Belayim field several miles to the north. The firm expected its production from the two fields to reach 10,000 bbl. daily by the end of this year. It was producing about 3,500 bbl. daily shortly after mid-year and the crude was being shipped to the Egyptian government refinery at Suez.

Officials of the company believe the Belayim field may prove to be larger than Shell's Ras Gharib field across the Gulf of Suez. The field has five Miocene producing horizons and the company says there may be a sixth. Late in the year, the company began a deep test 3 miles south of the Belayim production in an effort to test the Oligocene-Eocene contact.

Egypt imports more than 35,000 bbl. of crude daily and International Egyptian optimistically believes it will soon be able to eliminate the imports.

A large-scale exploration program is under way in Egypt's Western Desert by Egyptian-American Oil Co., the operator for four American companies with interests in two large concessions. The original concession was obtained by Conorada Petroleum Corp. Cities Service Co. later obtained an additional 10,000,000 acres to the west. The two areas give the four-company operation a concession over all of Egypt from the Nile River west to the Libyan border and north of the twenty-eighth parallel including the waters offshore.

Ownership of the original concession area negotiated by Conorada is now Continental Oil Co. and Ohio Oil Co., 27½ per cent each, and Cities Service and Richfield Oil Corp., 22½ per cent each. Those percentages are reversed in the second area with Cities Service and Richfield holding the bigger shares.

The operating company is drilling below 9,000 ft. in the first well staked on a structure 28 miles southwest of Alexandria. Drilling progress was slowed when a set of drill collars was lost in the hole below 8,000 ft. and fishing was unsuccessful. The lower 600 ft. of the hole at that point was sidetracked and redrilled. There have been no reports of any shows in the well.

A second rig was shipped to Egypt from the United States late this year and Egypt-American is doing extensive geological, aerial photomapping, gravitometer, and seismograph work throughout the concession area.

The Egyptian Government, which already has a 9,000-bbl. daily refinery at Suez, is building a new 43,000-bbl. refinery at Cairo. The first unit, a $8,500,000 distillation unit, will go into service just as soon at it is completed and other units will be added later.

The distillation unit will be charged with topped Arabian and Egyptian crudes moved by a 93-mile, 12-in. pipeline from Suez to Cairo. The unit will take only two cuts, diesel fuel and a gas oil, both for use in the Nile Valley. The heavy bottoms will be used in the Cairo power plant.

## East Africa . . .

EAST Africa was the scene of several exploration programs this year. Probably the most extensive was carried out by British Petroleum Co. Ltd. jointly with Shell Petroleum Co. Their exploration covered wide areas of eastern Kenya, Tanganyika, and offshore islands including Zanzibar. The program includes extensive drilling and geological and geophysical surveys. A deep test on Mafia Island off the Tanganyika coast reached about 9,300 ft. late this year.

A newcomer to the ranks of companies holding concessions in East Africa was Standard-Vacuum Oil Co., which acquired exploration rights in British Somaliland. Stanvac took over two areas totaling 11,380 sq. miles formerly held by Moriqui Exploration Corp., Los Angeles. Conorada Petroleum Corp. has a 36,000-sq. mile concession in British Somaliland.

In eastern Ethiopia, Sinclair Oil Co. continued drilling with a light rig on a concession it has held since 1945. American companies also have an interest in Somalia, an Italian-administered United Nations trust territory. The exploration company, Sinclair Somal, is owned half by Sinclair and half by Conorada's parent companies: Conti-

**EGYPT PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asl | 1948 | | 2,870-3,870 | 5 | 1 | 1 | | 3,017 | 23,821,003 | 22.0 | Eoc. ls. |
| Belayim | 1955 | | 5,100-7,600 | 3 | | | 2 | 500 | 44,786 | 23.0 | Mio. sd. |
| Feiran | 1949 | | 6,800 | 2 | | 1 | 1 | 600 | 88,962 | 26.0 | Mio. sd. |
| Gemsa | 1908 | | 400-2,000 | | | 1 | | | 1,442,098 | 41.0 | Mio. ls. |
| Hurghada | 1913 | | 700-2,500 | | 23 | | | 686 | 38,669,747 | 22-30 | Mio. cong. |
| Ras Gharib | 1938 | | 1,200-2,500 | 7 | 112 | 29 | 1 | 22,967 | 132,556,925 | 25-26 | Mio. ls. |
| Ras Matarma | 1948 | | 1,940-3,200 | 2 | 1 | | | 271 | 162,434 | 17-18 | Eoc. ls. |
| Sudr | 1946 | | 1,500-3,100 | 6 | 6 | 2 | | 5,967 | 24,743,042 | 19-23 | Eoc. ls. |
| Total Egypt | | | | 19 | 143 | 34 | 4 | 34,008 | 221,528,997 | | |

**EGYPT REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Anglo-Egyptian Oil Fields, Ltd., Shell House, 6 Sharia Tewfic, Cairo—Suez | 44,000 | | 6,400 | |
| Raffinerie de Petrole du Government, 18 Rue de Fouad Ier, Alexandria—Suez | 9,000 | | | |
| Total Egypt | 53,000 | | 6,400 | |

nental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp. The Italian state company, A.G.I.P., also holds concessions in the territory. In Mozambique, a Gulf Oil Corp. subsidiary holds a 46,000-sq.-mile concession.

The French company, Soc. des Petroles de Madagascar, was test drilling with one rig this year. The firm planned 18 months of field geology, 8 party-months of gravimeter, and 16 party-months of seismic work on the island in 1955.

## North Africa . . .

EXPLORATORY interest in Libya, prompted by the independent kingdom's new oil legislation, has almost completely overshadowed developments in the four main countries bordering North Africa.

The only crude production in Africa outside Egypt comes from two of these four, Algeria and French Morocco. The production is small, but exploratory work is being carried on in both. In French Morocco, the operating company, Soc. Cherifienne des Petroles, processes its production in a small refinery at Petitjean.

Royal Dutch-Shell is the only company outside French interests active in this area. Shell holds concessions in partnership with the French in Tunisia and Algeria. Gulf Oil Corp. was engaged in exploratory work in Tunisia, but abandoned its permits when the program failed to meet with success.

**French Morocco . . .** The Petitjean producing area was enlarged in 1955 when a good well 1½ miles from Bled Khatara field tested about 6,300 bbl. daily of good-quality crude from about 5,570 ft. In spite of the indicated high rate of initial production, the area around the new well, Zrar 6, has already been limited by dry holes drilled earlier to the north and south.

**Algeria . . .** Algeria has only one producing field, Aued Gueterini, and it is in the northern part of the country. But, the big exploratory effort is being concentrated in the vast sedimentary basins of the Sahara in southern Algeria. The French are optimistically hopeful about the waste areas of the desert because they feel any oil they find will be big.

Four principal areas are receiving exploratory attention. They are the Great Western Erg, a chain of high sand dunes in Central Sahara; the Clomb-Bechar basin, about 350 miles south of the northern coast; the Tindouf basin, along the Moroccan border, and the Hoggar range of mountains in Algeria's south.

Four companies have exploratory concessions that cover a total of 240,000 sq. miles in Algeria all the way from the plateau in the north to the Hoggar mountains. The companies are Soc. Nationale de Recherches et d'Exploitation des Petroles en Algerie (S.N. REPAL) Cie. Francaise des Petroles (C.F.P.), Cie des Petroles d'Algerie (C.P.A.), and Cie de Recherches et d'Exploitation des Petroles au Sahara (C.R.E.P.S.). The latter two are joint Shell and French Government ventures. Shell owns the major share of C. P.A. and a minority interest in C.R.E.P.S.

**Tunisia . . .** Like Algeria, Tunisia has been the scene of some pretty intensive exploratory work, but it has revealed very little to date.

Royal Dutch-Shell is the only private company in Tunisia since Gulf abandoned its exploration permits after drilling five dry holes and spending 7 million dollars. The Shell group holds a 65 per cent interest in Sic. Francaise des Petroles de Tunisie (C.P.D.T.) and has renewed its exploratory permits for another 3 years' work.

Tunisia's only find so far was a gas field on the Cap Bon Peninsula discovered in 1949. The gas is being moved to the city of Tunis and reserves in the field are estimated to be adequate to supply the city with gas for at least 15 years. The field was discovered by SEREPT, controlled by the French and Tunisian governments.

**Libya . . .** The United Kingdom of Libya, an Italian colony before it was granted its independence and self-government

**ALGERIA PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Oued Gueterini | 1949 | | 550-2,100 | 5 | 40 | 54 | | 1,100 | 1,960,000 | 38.0 | Ypresian, Lutetian ls. and ss. |

**FRENCH MOROCCO PRODUCTION**

| Name of field— | Year of discovery | Proved surface acres | Depth range (ft.) | Number of wells: Flowing | Pumping | Shut in | Midyear drilling | Prod. in bbl.: First half year | Accumulative to July 1 | Gravity, °A.P.I. | Geological data or prod. formation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ain Hamra | 1918 | | 400-4,500 | | 3 | 12 | | | | 38.0 | Mio. sd. |
| Bled Eddoum 1 | 1952 | | 4,300-4,800 | 7 | | | | | | 39.0 | Domerian sd. |
| Bled Eddoum 2 | 1952 | | 3,800-4,400 | | 9 | | | | | | Liassic l. |
| Bled Khatara | 1953 | | 4,600-5,000 | 2 | 6 | | | | | | Liassic l. |
| Bou Draa | 1936 | | 600-2,500 | 1 | | 2 | | | | | Liassic l. |
| Mers el Kharez | 1951 | | 4,400-4,600 | 6 | | | | | | 35.0 | Prim. Metamorphic |
| Oued Beth | 1947 | | 2,300-4,600 | 17 | | 2 | | | | 35.0 | Prim. Metamorphic |
| Oued Mellah | 1948 | | 1,800 | 16 | | | | | | 35.0 | Prim. Metamorphic |
| Sidi Fili 1 | 1950 | | 4,500 | 16 | | | | | | 38.0 | Prim. Metamorphic |
| Sidi Fili 2 | 1952 | | 3,900-4,600 | 3 | 2 | | | | | | Liassic sd. |
| Tselfat | 1934 | | 300-5,500 | | 2 | | | | | 45.0 | Liassic l. |
| Total French Morocco | | | | 68 | 22 | 16 | | 2,200 | 4,110,000 | | |

**FRENCH MOROCCO REFINING**

| Company and address—Refinery location— | Barrels per stream day: Crude distillation | Cat. cracking | Thermal operations | Special processing |
|---|---|---|---|---|
| Ste. Cherifienne des Petroles, 27 Ave. Urbain Blanc, Rabat—Petitjean | 2,100 | | | |

by the United Nations in 1952, has stolen the North African limelight with a dozen international oil companies jostling for acreage.

Libya first began granting 1-year exploration licenses late last year after the country's parliament passed a new mineral-resources law. A dozen companies, 10 of them American, applied for acreage in August. The relatively simple geology of the country lured most of the applicants to the same areas. More than 50 applications were filed as many as 8 overlapped in some areas. Representatives of the companies were called to a conferenc in Tripoli early in October to work out the conflicting applications. This was done under the terms of the new oil law.

The conference was successful and all the conflicts were worked out without the Libyan Government finding it necessary to step in and decide a dispute. The government began granting concessions in December and the first one for a 20,000-sq. km. area in the province of Fezzan went to Standard Oil Co. (N.J.).

Exploration should be well under way in Libya early in 1956. The oil law provides that an applicant must start work within 8 months after a concession is granted.

## Union of South Africa . . .

PRODUCTS from the Union of South Africa's coal-to-oil plant went on sale this year, marking the first time in peace that synthetic oil has served a country as a major source of supply.

The South African Coal, Oil & Gas Corp., Ltd., (S.A.S.O.L.), plant supplies about 4,300 bbl. daily of gasoline plus other products out of a total demand of around 50,000 bbl. daily. The plant is on a 5,000-acre site at Coalbrook about 50 miles south of Johannesburg. Direct and indirect costs came to about $114,000,000.

The plant plays a more important part in the Union's oil-industry picture than the actual percentages of oil it supplies. Economically, construction was justified because of vast coal supplies which can be mined cheaply and because of high rail costs for shipping oil from the coast to Johannesburg. It also would make South Africa self sufficient, to a degree, in case of war. Freight from the S.A.S.O.L. plant to Johannesburg is about 2½ cents per gallon of gasoline against around 10 cents from the coast. There has been proposals for a pipeline from the coast. Backers say a line would carry products to the capital for little over a cent a gallon. So far, the government has failed to approve such a project. To help improve rail service, 300 tank cars were bought this year.

S.A.S.O.L.-made gasoline sells for about a cent a gallon less than imported supplies do. Private marketing companies distribute about two-thirds of the plant's output. These are Caltex, Shell, Standard-Vacuum, and British Petroleum, which last year bought Atlantic's facilities. The remaining output is sold through a firm recently acquired by S.A.S.O.L., South Africa Torbanite Mining & Refining Co., Ltd., (S.A.T.M.A.R.).

South Africa has one refinery, a 17,300,-bbl. daily plant near Durban operated by Stanvac. The plant has a 6,300-bbl. catalytic cracker. Caltex (Africa), Ltd., is adding lubricating-oil blending facilities to its Durban terminal. The $600,000 project will include a 5,400-gal. per hour Cornell homogenizer, storage tanks, warehousing, a rail siding, and dock pipelines for receiving bulk stocks. The construction will be finished the first half of 1956. This year, Cie. Francaise des Petroles (C.F.P.), which is about 35 per cent owned by the French Government, set up a marketing company in the Union.

South Africa's government-sponsored oil search has ended and has been officially termed a failure. The program had been carried on since 1939 when it was undertaken as a part of the war effort. Most recent of the survey activities was a test well drilled near Dannhauser, Natal. It was drilled as a result of an oil seepage found in a coal mine, Durban Navigation Colliery. At Boksburg near Johannesburg, S.A.T.M.A.R. refines about 300 bbl. daily of gasoline from shale oil mined at Ermelo, 140 miles east of the capital.

## West Africa . . .

EXPLORATION work in West Africa had its best year to date in 1955.

Several years of search were rewarded by a discovery in the Portuguese possession of Angola and in the French Cameroons.

In Angola, a well drilled by the Belgium firm, Cia. Financiere Belge des Petroles Ste. Anonyme, Petrofina, found oil about 13 miles south of the capital, Luanda. The wildcat, 2 Benfica, tested light, good-quality crude from 8,400 ft. at the rate of 300 bbl. daily. Petrofina and the Portuguese Government have made preliminary arrangements for the construction of a 30,000 bbl. daily refinery in Angola. But the project hinges on whether a sufficient level of production can be developed. Petrofina holds majority interest in Cia. de Combustiveis do Lobito (Carbonang). This company, in turn, holds an exploration concession over most of the narrow basin along Angola's northwest coast.

Among other wells drilled by Petrofina, a test between Luanda and the mouth of Rio Quanza River had gas and oil shows and a strong flow of water. It was abandoned in December 1954 because of mechanical trouble.

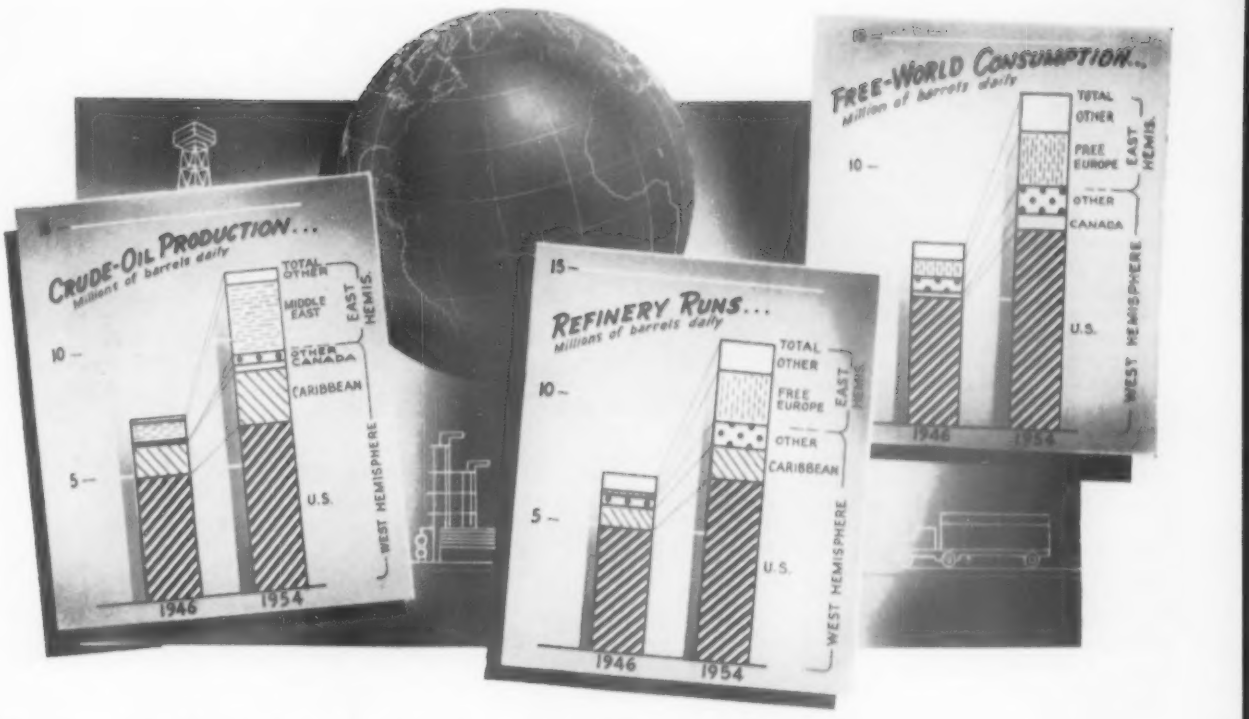
In the French Cameroons, gas was discovered in the Doula area by Ste. Recherches et Exploitation des Petroles du Cameroun (S.E.R.E.P.C.A.). The well blew out when it struck high-pressure sands at about 5,800 ft. Tests on the well, LA-101, indicated a pressure of 1,000 psi. with a ¾-in. choke. It may have a normal flow of 35,000 M.c.f. daily. S.E.R.E.P.C.A. has drilled more than 20 wells in the Douala and adjacent Bomono area.

Farther northwest, in Nigeria, encouraging shows of oil were found this year by Shell-D'Arcy Petroleum Development Co. of Nigeria. A 50-50 subsidiary of Royal Dutch-Shell and British Petroleum Co., Ltd., Shell-D'Arcy has explored in Nigeria since 1937, except during the war. The eleventh well was started in September. A deep test 45 miles east of Port Harcourt reached about 6,800 ft.

Other West African exploration in 1955 included a test well drilled by Petrofina in central Belgian Congo. Petrofina is contractor for a joint venture of state and private interests, Syndicate d'Etudes Geolgiques et Minieres de la Cuvette Centrale. In French West Africa, a subsidiary of Bureau de Recherches de Petrole, has been granted. The firm, Ste. d'Etudes et de Reconnaissances Petrlieres au Senegal, started a well in this area last December.

In French Equitorial Africa, S.P.A.E.F. did 6-party-months of gravity work and 36 party-months of core drilling and wildcatting in 1955. Work so far has shown a large salt-dome basin exists near the coast. Other West African developments included the formation of Gold Coast Gulf Oil Co., by Gulf Oil Corp. Gold Coast Gulf is studying possibilities of an oil search in Gold Coast or nearby areas.

West Africa continued to grow as a marketing area. Consumption is small compared to such areas as Europe or the United States, but demand is increasing at a high rate and the potential is enormous. Late last year, the world's longest offshore loading line was installed at Accra, Gold Coast, for Socony Mobil Oil Co. The 12-in. line extends 11,500 ft. into the Atlantic Ocean to a four-buoy tanker anchorage.




The Free World developed a new source of industrial leadership in . . .

# 1946-54: When Oil Became King of Energy

## *Here are the highlights of oil's amazing postwar growth . . .*

**by C. J. Robrecht**

. . . it deposed King Coal as the Free World's top source of energy by almost doubling its contribution to total energy consumed.

. . . its production jumped about 57 per cent from 1946 to 1954, and refinery runs kept pace with a 55 per cent increase.

. . . its greatest consumption increase came in Western Europe where its use almost tripled in the postwar years.

OIL has proved to be one of the world's most precious heritages. From the primitive use of bitumen in Biblical times to the present day utilization of highly refined products, man has used ever-increasing quantities of oil not alone as a prime instrument of labor saving but also to enhance his own comfort and pleasure. The tremendous economic progress that has been accomplished throughout the world since the middle of the nineteenth century has been due largely to oil both as a fuel and as a lubricant. In these past 100 years the free world has produced and consumed some 74 billion barrels of oil. Russia and the iron-curtain countries account for another 10 billion barrels. The importance of oil as a supplier of energy is unquestioned and continued progress in the years ahead is closely linked to petroleum availability.

The author is head of the petroleum industry economics division, Standard Oil Co. (N. J.).

As a measure of the rising tempo of economic and industrial growth which has stimulated the demand for oil, it is helpful to examine the postwar growth of energy requirements. These provide an accurate measurement of the rapid rise in living standards that has occurred since World War II.

Obviously petroleum cannot be considered alone in appraising a worldwide energy balance. The other commercial forms of energy, such as coal, natural gas, and hydro power when combined, still outweigh oil's share of the balance, and will continue to do so in the foreseeable future. In addition we can recognize only a general order of magnitude of the contribution by wood, charcoal, etc., (so-called substitute fuels). In some Latin American and Far East countries these fuels still exceed all known commercial energy suppliers.

**Oil's share** . . . Immediately prior to World War II, oil's share of the energy consumed in the free world was less than one-quarter of the total. The accompanying chart shows the growth

that has taken place since then, in terms of B.t.u.'s, a common denominator for all energy units. Coal consumption actually declined volumetrically between 1947 and 1954, at which time it was supplying 41 per cent of all commercial energy needs. This compares with a 55 per cent position 7 years earlier. Roughly three-quarters of this lost position was taken up by oil, with natural gas and hydro power picking up the remainder.

The United States is the world's leading energy consumer, with current requirements constituting about one-half of the free world total. Oil displaced coal as the No. 1 United States energy supplier in 1950, and subsequent years have seen a continued worsening position for coal, due particularly to the phenomenal growth pattern of natural gas. In the next several years, gas is likely to take over as No. 2 United States energy supplier relegating coal to third position.

This shift from the use of coal to the more convenient, efficient liquid product also is evident abroad. While coal is firmly entrenched as the basic energy supplier in Europe, oil has made even more striking gains percentage-wise in foreign areas than here in the United States. It has almost doubled its share of the energy supply structure since 1938, compared with a corresponding 33 per cent gain in the United States. There is a widening recognition that foreign coal supplies are economically limited in growth potential to rates well below the sharply rising demands for energy fuels. Oil is being called upon more and more to make up coal's short fall.

### Postwar Consumption

With this brief energy story as a background, it is of interest to consider the sources which are contributing to this rising torrent of oil. Better than 40 per cent of all oil production since record keeping began back in the 1850's has occurred in the past 9 postwar years, during which free world crude-oil production totaled 32 billion barrels. The United States has yielded some 19 billion barrels, or 60 per cent of this total. Free world crude production in 1954 reached about 12¼ million barrels daily which was better than 5 million barrels daily higher than in 1946. While the United States had in the past exceeded the combined output from all other areas, production abroad recently has overtaken, and in the past few months actually surpassed the United States production rate. In September foreign production represented 51 per cent of the free world total.

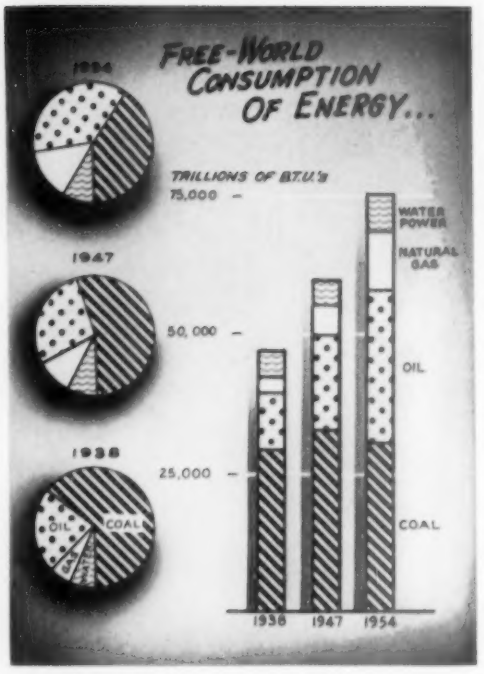
The very sharp rate of growth abroad, as illustrated in the chart, is attributable principally to Venezuela and the Middle East. These two areas together represented in 1954 more than three-quarters of all foreign production, and almost 40 per cent of the free world total. Venezuela's rise has been steady, though less spectacular than that of the Middle East. While an increasingly large share of Venezuelan production is required in this hemisphere for local needs, its heavier oil fractions are finding new markets in the European industrialized areas.

**Middle East burgeons . . .** The Middle East, since its development during World War II, has experienced a four-fold postwar expansion. Its growth has closely paralleled and largely supported the rise of the European refining industry. There has been but one interruption in its steady climb since 1946, that due to the mid-1951 nationalization of Iranian properties. Other Middle East supplies, however, promptly became available to fill the breach. Now, more than 4 years later, and only a year after resumption of operations, crude production in Iran is halfway back to its prenationalization level. Saudi Arabia and Kuwait are hovering around the million-barrel-a-day mark, followed by rapidly growing production in Iraq at better than 700,000 bbl. daily. Saudi Arabia and Iraq have increased their output six or seven times during these postwar years. Kuwait was just getting started back in 1946.

In the Western Hemisphere Canada also has enjoyed rapid progress. Since discovery of the prolific reserves in the prairie provinces, production has grown from about 20,000 bbl. daily to the current 350,000 bbl. daily. Although hardly discernible on the chart, Canadian crude now is satisfying a much greater share of local needs and, by way of the newly developed pipeline system, is finding markets in the U. S. Pacific Northwest, and to a lesser degree in the Minneapolis-St. Paul area.

While some locally significant discoveries have been made in the Far East, crude production which centers largely in Indonesia and British Borneo, did not recover to the level established before the Japanese occupation until 1949. Since then the area has almost doubled its production rate.

There has been no difficulty in maintaining crude production to provide adequate supplies for charging the refineries throughout the world. Refining has experienced better than a 5-million-barrel-daily growth since 1946, but in recent years, new refinery construction has grown at an even faster rate. By 1954 there was an apparent 2½ million barrels daily of surplus crude-distillation capacity. This was about evenly divided between the United States and the rest of the free world.




**FOR THE ADDED ENERGY it needed to forge the weapons of survival, the Free World turned to oil and gas.**

### Self-Sufficiency Sought

Since 1946 there has been a strong trend toward building refining capacity in consuming area as opposed to direct importation of refined products. This is particularly true of Europe where refining operations in the past 9 years have grown from less than 150,000 bbl. per day to something close to 2

**FREE WORLD CONSUMPTION OF ENERGY**
(Trillions of B.t.u.'s)

| | 1938 | Per cent of total | 1947 | Per cent of total | 1955 | Per cent of total |
|---|---|---|---|---|---|---|
| Coal | 29,396 | 65.1 | 32,896 | 55.1 | 30,594 | 40.8 |
| Petroleum | 10,260 | 22.2 | 17,111 | 28.8 | 27,635 | 37.9 |
| Natural gas | 2,742 | 5.8 | 5,407 | 8.5 | 10,862 | 13.4 |
| Water power | 3,098 | 6.9 | 4,584 | 7.6 | 6,212 | 7.9 |
| Total | 45,496 | 100.0 | 60,088 | 100.0 | 75,258 | 100.0 |

million barrels daily. Last year European refinery capacity was essentially in balance with local refined product needs, except for aviation gasoline and some specialty products. Local refined product coverage in 1946 was only about 20 per cent of the total requirements.

This trend is becoming increasingly strong in Latin America and also in the Far East. With new or planned refineries in such countries as Brazil, Chile, and Puerto Rico, Latin America's dependence on product imports is lessening noticeably. Likewise, the area east of Suez is making a strong bid for product self-sufficiency from its new refineries in Australia, Japan, the Philippines, and India.

### Trade Routes Changed

The trend to refining in consuming areas has resulted in considerable change in the pattern of international oil flow. Perhaps the most significant development has been the emergence of the Middle East as the principal crude-oil supplier for Eastern Hemisphere refineries. As an illustration, European requirements in 1946 were satisfied largely by refined products shipped from Western Hemisphere sources. They represented almost 60 per cent of Europe's receipts, most of which was crude oil.

The over-all changes which have taken place in these postwar years are best brought into focus by the inter-hemispheric movement pattern. In 1946 about 650,000 bbl. daily moved east from Western Hemisphere sources. The United States accounted for 38 per cent of the total and about 90 per cent of all the oil moved was refined products. Last year the west-to-east movement was just about the same volumetrically as in 1945 with about 75 per cent of the total as products. The western movement of Eastern Hemisphere supplies has changed even more radically. From practically no movement at all in 1946, east-west trade has grown to over 300,000 bbl. daily in 1954, of which about 270,000 bbl. daily was Middle East crude. In 1954 there were gross crosshaul shipments amounting to nearly 1 million barrels of oil daily—as contrasted with a one-way movement in 1946.

The rapidly growing requirements, particularly in areas with little or no indigenous supplies, has necessitated a sharp expansion of the oil industry's transportation facilities. The free world's working tanker fleet, for instance, (excluding government-owned ships) grew from less than 700 T-2 equivalent vessels in 1946 to over 1,800 by the end of 1954. This 160 per cent increase during the postwar years compares with an 84 per cent in free world oil consumption.

### Oil Consumption

The free world consumed more than 4¾ billion barrels of oil during 1954. This is better than 13 million bbl. per day.

About 60 per cent of all this oil actually was consumed right here in the United States. It was about 2,800,000 bbl. daily above the 1946 level and it reflected a growth of about 6 per cent in each of these 8 postwar years. The year 1954 actually was one of slight economic recession. The strengthening economy late in the year combined with some colder-than-usual weather, provided a nominal 2 per cent increase over the previous year. This was the smallest United States postwar gain except for 1949.

Oil consumption abroad in general was not affected by the business slowdown in the United States in 1954. The foreign growth of 12 per cent was even a bit higher than the average annual gain for the previous postwar years. It was a direct result of the improving economic and industrial conditions, and manifested itself in sharply growing demands for distillates and heavy fuel oils.

**Europe star performer . . .** Practically every area shared in this improvement. Europe, however, was the outstanding performer. Its economic recovery between World War II and 1954 has been little less than spectacular. During much of this period, the peoples of Europe consciously curbed their consumption habits—in order to expand their industrial capacity. A tremendous oil-hungry manufacturing and transportation system has evolved which is rapidly raising European living standards. Many economists believe that this is no haphazard nor temporary expansion. It may well be the start of a new era of unprecedented prosperity.

Between 1946 and 1954 oil consumption in Europe just about tripled, corresponding to a growth of 15 per cent each year—almost double the annual rate for the entire free world. As might be expected, it was the heavier industrial fuels that enjoyed the greatest gains during this period. Heavy fuel oil demand more than quadrupled for a 21 per cent increment. Lighter fuels increased at the rate of 15 per cent a year. Despite the fact that better than 40 per cent of Europe's record automobile production in the postwar years has been earmarked for export, their gasoline consumption has doubled since 1946. In the last 2 years, automobile ownership and operations have been made a little easier for the average European. Gasoline prices, however, still are heavily burdened with consumer taxes, which probably will continue to temper the growth to a fairly modest rate.

With the exception of such countries as Canada, Brazil, and Japan, other less-industrialized areas have lagged somewhat with respect to their oil-consumption growth rate. As they strive to expand their economic structure and improve the living standards of their people, oil will be called upon to supply a major part of their energy requirements to support this growth. Given the opportunity to operate competitively and with the incentive of free enterprise, there is every reason to believe the oil industry will continue to provide ample supplies for its rapidly expanding markets.

**CONSUMPTION—REFINERY RUNS—CRUDE PRODUCTION**

| | Consumption | | | | Refinery runs | | | | Crude-oil production | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Average annual gain | | | | Average annual gain | | | | Average annual gain | |
| | 1946 | 1954 | Vol. | Per cent | 1946 | 1954 | Vol. | Per cent | 1946 | 1954 | Vol. | Per cent |
| United States | 4,912 | 7,752 | 355 | 5.9 | 4,740 | 6,958 | 277 | 4.9 | 4,751 | 6,346 | 199 | 3.7 |
| Canada | 277 | 559 | 42 | 11.9 | 195 | 464 | 34 | 11.4 | 20 | 263 | 30 | 38.3 |
| Caribbean | 166 | 282 | 14 | 6.8 | 774 | 1,297 | 65 | 6.7 | 1,181 | 2,070 | 111 | 7.3 |
| Balance Western Hemisphere | 440 | 840 | 50 | 8.4 | 237 | 448 | 26 | 8.3 | 233 | 378 | 18 | 6.3 |
| Free Europe | 686 | 2,117 | 179 | 15.1 | 145 | 1,933 | 223 | 38.2 | 17 | 86 | 9 | 22.5 |
| Middle East | 147 | 298 | 19 | 9.2 | 642 | 583 | —7 | —1.2 | 700 | 2,739 | 255 | 18.5 |
| Balance Eastern Hemisphere | 513 | 1,204 | 86 | 11.3 | 50 | 545 | 62 | 34.8 | 47 | 390 | 43 | 30.2 |
| Total free foreign | 2,179 | 5,300 | 390 | 11.8 | 2,043 | 5,270 | 403 | 12.6 | 2,198 | 5,926 | 466 | 13.2 |
| Total free world | 7,091 | 13,052 | 745 | 7.9 | 6,783 | 12,228 | 680 | 7.7 | 6,949 | 12,272 | 665 | 7.4 |

OVER-ALL VIEW of Australia's Kwinana refinery, located on Cockburn Sound, 17 miles south of Fremantle.

## IT'S AUSTRALIA'S BIGGEST . . .

# Kwinana Refinery Now a Seasoned Plant

IN THE early hours of February 1, 1955, the Kwinana refinery came on stream for the first time and the No. 1 distillation unit started to process crude oil.

The plant, built at an estimated cost of $80,000,000, is Australia's biggest refinery. Capacity is approximately 70,000 bbl. of crude oil per day. Products include 15,500 bbl. per day of gasoline; 1,400 bbl. per day of power kerosine; 1,400 bbl. per day of aviation turbine fuel; 4,600 bbl. per day of gas oil; 5,000 bbl. per day of diesel oil, and 36,000 bbl. per day of furnace oil.

### Planning and Construction

The plant was completed 3½ months ahead of schedule. This record rate of construction on a project unique in Western Australia can be attributed to a number of factors.

All the developmental work was made possible by skillful planning by company engineers and chemists in the early stages. Having decided on the types of process plant and the general layout of equipment, tankage, and utilities, the work of detailed design, drafting, and procurement was contracted out by British Petroleum Co. Ltd. (the then Anglo-Iranian Oil Co.) to M. W. Kellogg Co., of New York.

This company, in turn, employed its British registered associate, Kellogg International Corp., to execute in conjunction with the Kwinana Construction Group and other British and Australian contractors and architects, the actual construction.

Under company supervision, a small number of American field engineers, supplemented by experienced British and Australian technical staff, built up an effective construction force.

**Why Kwinana was chosen . . .** Late in 1951 a party of British Petroleum Co. experts from London was sent to Australia to choose a suitable site for a new refinery. Kwinana was chosen as an area suitable for the purpose.

Situated 17 miles south of the port of Fremantle, the 950-acre site consisted of flat land, covered only by the lightest of coastal scrub. Well above sea level and having excellent load-bearing qualities, the land faces Cockburn South with deep water reaching close inshore.

The sound, which consists of 17,000 acres of deep water, is virtually land-locked and offers a natural harbor. Giant 32,000-ton tankers of British Tanker Co.'s fleet are able to berth at the refinery jetty.

**Construction . . .** In November 1952, subcontracts were let for preliminary scrub clearing, soil testing, and the fencing of the site. It took 4 miles of fencing to enclose the area.

In February 1953, the first shipment of materials arrived and 2 months later concrete was poured for the foundations of one of the distillation units. Other foundations for process and treatment plant followed quickly.

Kwinana's first of about 30 towers and vessels was erected in September 1953. By the end of 1954 construction was virtually completed, ahead of schedule. And on January 11, 1955, the "British Crusader," loaded with crude berthed at the jetty.

### Processing Units

The main processing units at Kwinana consist of: (1) two atmospheric distillation units, (2) vacuum distilla-

**THIS PLATFORMER** converts straightrun naphtha into a high-grade motor fuel component.

**PLOT PLAN** of Kwinana refinery and surrounding area.

tion plant, (3) orthoflow catalytic cracking unit, (4) Platformer, (5) Hydrofiner, (6) treating units, and (7) asphalt plant.

### Oil Processing Units

**Atmospheric distillation . . .** The capacity of each of the atmospheric distillation units is approximately 35,000 bbl. per day.

Crude oil from storage tanks in the tank farm is pumped to the units. When the oil reaches the unit, it passes through heat exchangers where it picks up heat from the outgoing products before passing to the heating furnaces. The crude is heated to approximately 670° F. in these furnaces before being passed to the fractionating column.

The bubble-cap fractionating column is 127 ft. high and 12 ft., 6 in. in diameter. At the top of the column gas and a gasoline component are obtained, followed in descending order by naphtha, kerosine, gas oil, and a residual fuel oil at the base.

Attached to the atmospheric distillation units are solutizers for the removal of mercaptan sulfur and stabilizers for the removal of gas. Here the gasoline is further treated before being passed to storage.

**Vacuum distillation unit . . .** The function of this unit, which has a capacity of 24,000 bbl. per day, is to further distill the residue from the atmospheric units. The column is maintained under a vacuum of approximately 90 mm. of mercury.

The fractionating column of this unit is 74 ft. 6 in. high and 21 ft. in diameter at the largest section. The product from the top of the column is a waxy gas oil which is used as feed stock for catalytic cracker. Bottoms from the column is taken either for fuel oil or is air blown to yield asphalt.

**Catalytic cracking unit . . .** The catalytic cracker is of the orthoflow type. It has a capacity of 13,000 bbl. per day. The regeneration of catalyst, reaction, stripping, and catalyst circulation facilities are all included in a single vessel. It is 142 ft. high from ground level.

Products from this unit are sent to a fractionating and other columns where separation takes place before being passed to storage.

**Platformer . . .** Capacity of this unit is about 6,000 bbl. per day. The purpose of the Platformer is the conversion of naphtha into a high-grade gasoline component.

The process can be divided into three operations: (1) prefractionation, (2) catalytic reforming, and (3) stabilization. In the prefractionation step the feed stock is passed through a fractionating column where the charge for catalytic reforming is taken off as a selected side cut.

The charge is again heated before passing to the first of the reactor vessels, the temperature being raised to about 950° F. at a pressure of about 700 psi. After repeating the operation in two more reactors, the platformate is passed to a stabilizer for the removal of light ends and for the manufacture of a bottoms cut which is used as a base material for power kerosine.

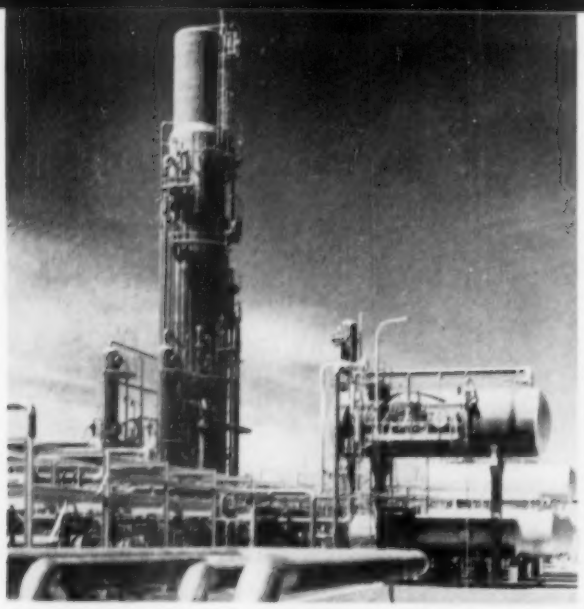
Hydrogen used for recycling with the feed is treated in a Girbotol unit for the removal of hydrogen sulfide.

**Hydrofiner . . .** This unit has a capacity of 5,600 bbl. per day. It carries out a process exclusively developed by British Petroleum Co. for the desulfurization of kerosine-gas oil mixtures.

This is accomplished by contacting the oil with a fixed-bed catalyst at high pressure and moderate temperature in the presence of a recycle gas stream rich in hydrogen. The hydrogen is obtained from the excess generated by the Platformer. Sulfur combines with the hydrogen to form hydrogen sulfide which is then stripped from the product.

**Asphalt . . .** The asphalt plant has a capacity of 20,000 tons per year. The residue from the vacuum distillation unit enters the blowing tower of the unit at elevated temperatures and is air-blown for the desired length of time.

**Steam-generating plant . . .** Large quantities of steam are necessary for process



ONE OF TWO atmospheric distillation units in use at Kwinana.

THIS CATALYTIC CRACKING UNIT converts gas oil into high-grade gasoline.

requirements. These needs are met by a battery of five water-tube boilers, together with their auxiliary equipment.

Each of the five boilers has a maximum capacity rating of 75,000 lb. of steam per hour at a pressure of 200 psi. and superheated to a temperature of 500° F. In common with other furnaces in the refinery the boilers are fitted with dual burners for the use of either gas or liquid fuel.

For the treatment of boiler feed water, base exchange and deaerator units have been installed. To reduce feed-water makeup requirements, a condensate return system operates from each consumer unit.

**Cooling water system . . .** To provide the 3,000,000 gal. of sea water per hour necessary for process requirements, a pump house has been erected containing four steam-turbine-driven pumps each capable of pumping 20,000 g.p.m.

The water is drawn from Cockburn Sound through an intake flume and thence through rotary screens. The fire-fighting water booster pumps are located in the same pump house. These start automatically when the pressure in the fire-fighting water main drops due to the opening of a hydrant valve.

Specially designed circular separators automatically separate any oil present from the return sea water. This insures that the water, on its return to Cockburn Sound, is completely oil free. Provision is also made for the reception of ballast water from tankers in order that any oil present may be removed before the water is returned to the sea.

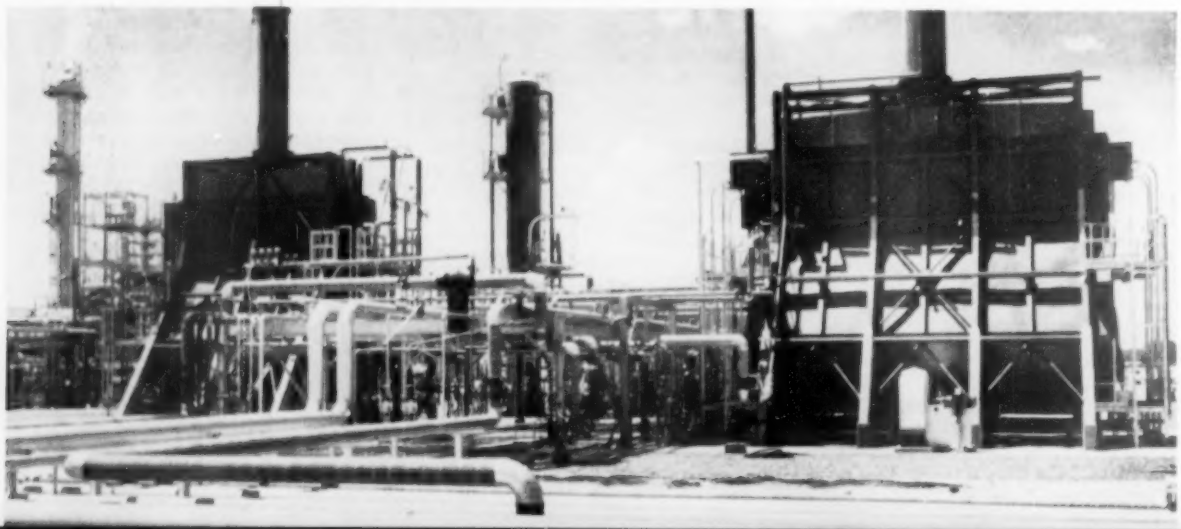
**Electricity . . .** Electricity for the operation of the refinery is obtained from the South Fremantle power station by means of two independent 22-kv. overhead transmission lines. These feeders terminate at the main switching station within the refinery where the supply is transformed to 11 kv. before being taken to the four main substations.

Here the voltage is further reduced to 3.3 kv. for distribution to the various smaller substations. The substations also house the control gear for the motor-driven pumps on the various units which is operated from push-button stations situated adjacent to the respective motor. Free protection is provided both on the main incoming supply and for the distribution within the refinery.

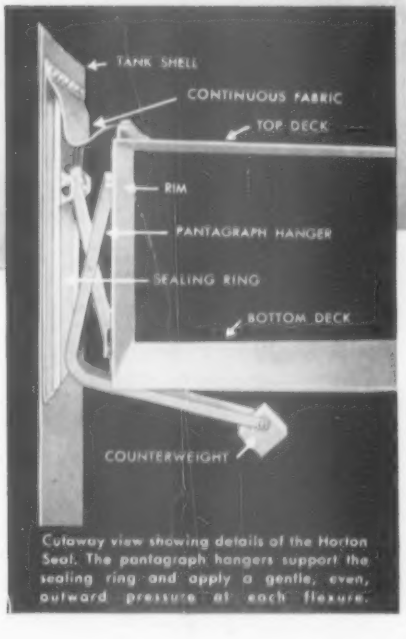
**Jetty . . .** The steel-and-concrete jetty consists of a 1,000-ft. shore arm and an 1,800-ft. trunkway running parallel to the coastline. Three T-heads extending seawards from the trunkway provide berths for three tankers simultaneously.

Each T-head has an independent pipeline system and can accommodate tankers ranging in size from 8,000 to 32,000 tons.

THE HYDROFINER is used for desulfurization of kerosine-gas oil mixtures.



# A Horton Seal paying its way...




Cutaway view showing details of the Horton Seal. The pantagraph hangers support the sealing ring and apply a gentle, even, outward pressure at each flexure.

This Horton® Seal is part of a Horton Double-Deck Floating Roof installed in a 64,000-bbl. gasoline storage tank at a large western refinery. Standard equipment on all Horton Floating Roofs, the Horton Seal pays its way by preventing the evaporation of volatile hydrocarbons between the rim of the roof and the tank shell. When the Horton Seal is installed on a tank, no secondary seal is required.

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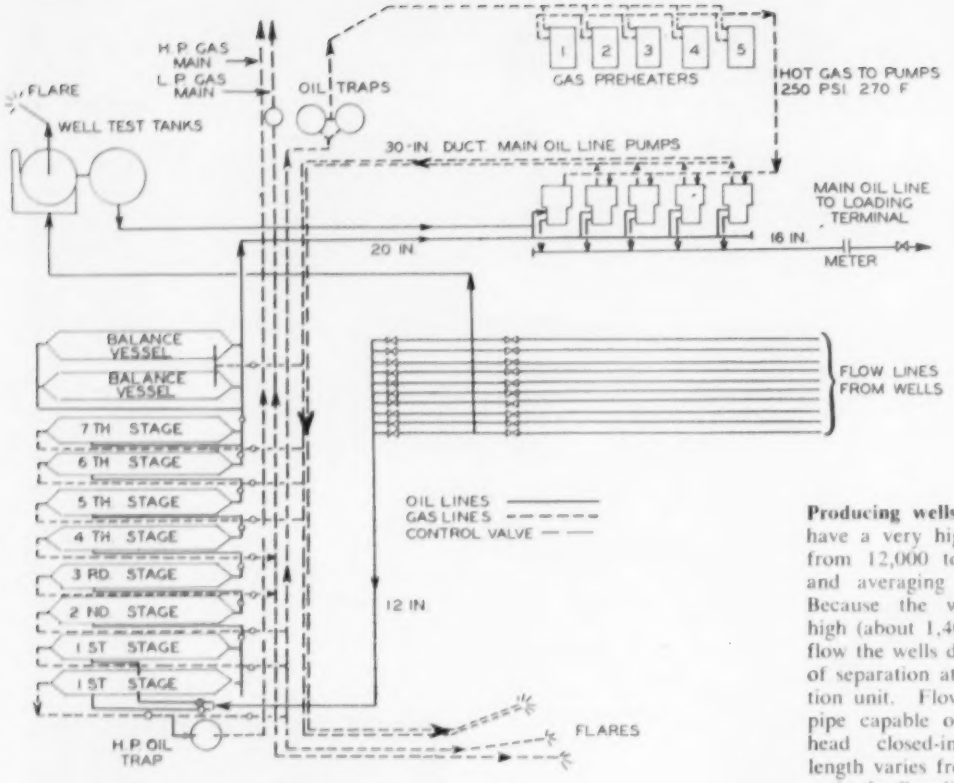


**OPERATING SEQUENCE of the No. 2 production unit at Agha Jari. Fig. 1.**

*In Iranian oil fields . . .*

# Multistage Separation Conserves Crude Oil

## Plant reduces pressure, removes gas, and relays stabilized crude to outlets 45 and 100 miles away

**by Morteza Khosrovi**
Iranian Oil Participants, Ltd.

PRODUCING Agha Jari field in south Iran is a big operation. Recent oil production has been about 269,000 bbl. per day. Since less than 20 wells are required for this total, oil-handling equipment and methods must be on a big scale.

One of the big problems in producing the field is to reduce the high pressure of the crude oil as it comes from the wells without losing the valuable light fractions such as butane and pentane. This is being achieved by multistage separation. Described here is a recently completed crude-oil-separation plant designed to process about 157,000 bbl. per day of crude oil. The plant reduces the crude-oil pressure, removes the gas, and relays the stabilized crude to oil outlets 45 and 100 miles away.

The design of this unit is based on the well-known principles of multistage pressure separation of crude oil. Instead of flashing the crude in a single-stage low-pressure separator, the unit reduces the pressure stepwise and removes the equilibrium gases at each step. As a result, the combined gas from the multistage unit is leaner than the gas from a single-stage unit and the crude retains more of the butanes and heavier components. Apart from the quality of the final crude product, the difference in gravity between multistage crude and single-flash crude from the same field may be as much as 3.5° A.P.I.

**Producing wells . . .** Agha Jari wells have a very high productivity ranging from 12,000 to 30,000 bbl. per day and averaging 24,000 bbl. per day. Because the wellhead pressures are high (about 1,400 psi.) it is possible to flow the wells directly to the first stage of separation at the multistage production unit. Flow lines are mostly 8-in. pipe capable of taking the full wellhead closed-in pressure. Flow-line length varies from 0.5 to 3.5 miles.

At the flow-line manifold the production from all the wells is combined and passes to the separation units. However, provision is also made for testing producing wells individually by passing the oil to a separate header. This header leads to a single-flash flow tank with a dip tank for measurement of the oil. The crude from well tests passes to the main pumps to combine with the main oil stream and the gas is flared.

**Multistage unit . . .** Fig. 1 shows the operating sequence of the production plant. The horizontal separator vessels are all 4½ ft. in diameter by 150 ft. long made up in 25-ft. flanged sections. The ends are conical with a slope of 1 to 21. The oil enters tangentially near the upper end and is deflected down the vessel by a guided scroll. The operating level is maintained at approximately half the diameter at the lower end.

Owing to the large volume of gas to be handled in the first separation stage, two vessels in parallel are used. The balance vessels after the last stage are each 8 ft. in diameter by 150 ft. long and are intended to maintain an operating cushion for the pipeline pumps since no storage tanks are provided. The pumps draw directly from the separator unit.

The following table gives the operating conditions of the separator unit, designed for a crude throughput of 157,000 bbl. per day.

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... as critical as caustic soda

... as volatile as chloroform

as viscous as molasses

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| Stage— | Optimum operating pressure at 80° F., psig. | Gas evolved, M.M.s.c.f. per day |
|---|---|---|
| 1 | 885 | 89 |
| 2 | 385 | 19.5 |
| 3 | 135 | 10.5 |
| 4 | 75 | 5.3 |
| 5 | 30 | 3.5 |
| 6 | 15 | 2.6 |
| 7 | 0 | 1.7 |
| | | Total 132.1 |

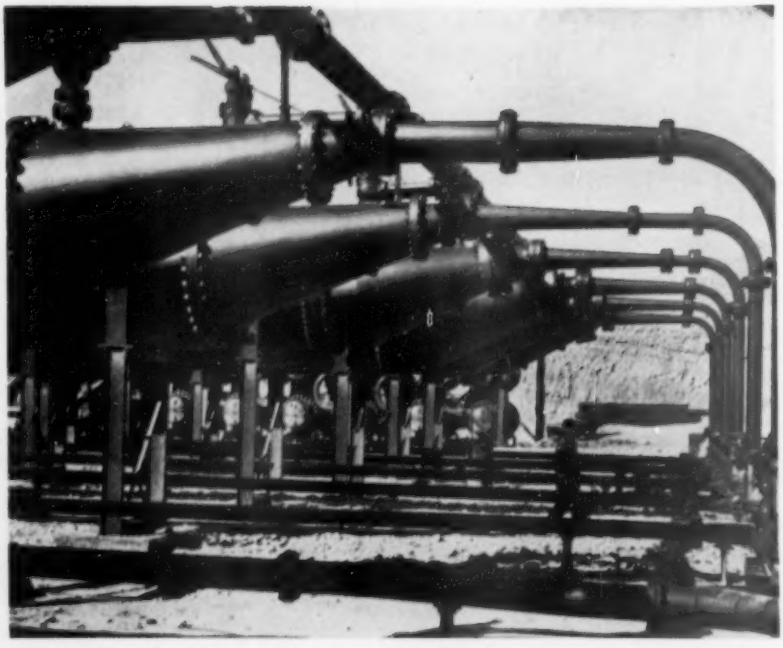
**Automatic controls** . . . Operation of the unit is fully automatic within the separation process. That is, the oil levels and pressure of the various vessels are maintained at predetermined settings commensurate with the throughput and crude quality required. Well connections are designed to give production in excess of requirements, and the quantity of crude required is set by the meter measuring the crude entering the pipeline.

A control valve on the oil inlet line to the first separator responds to the oil level in that vessel so controlling the input to maintain the desired throughput. The levels of the other vessels are similarly controlled by regulators on the oil inlet. The last vessel has, in addition, a low-level controller operating the gas supply to the pump turbines to prevent the vessel being emptied.

The pressure in each vessel is held to the setting required by a back-pressure regulator, and on the last three stages the pressure is automatically adjusted by temperature controllers to maintain constant crude quality irrespective of the daily and seasonal temperature fluctuation of the crude entering and leaving the unit.

Continuous records are made of the oil and gas volumes, the pressures in the unit, and the specific gravity of the final crude. Fortunately, the water content of Agha Jari crude is negligible but, as a precaution, automatic water detectors are installed in the main oil lines to record the water content and sound an alarm if excess water is present.

All vessels, pumps, etc. are protected by means of safety valves operated by the liquid levels and a system of warning lights which change from green to red during any abnormal condition.



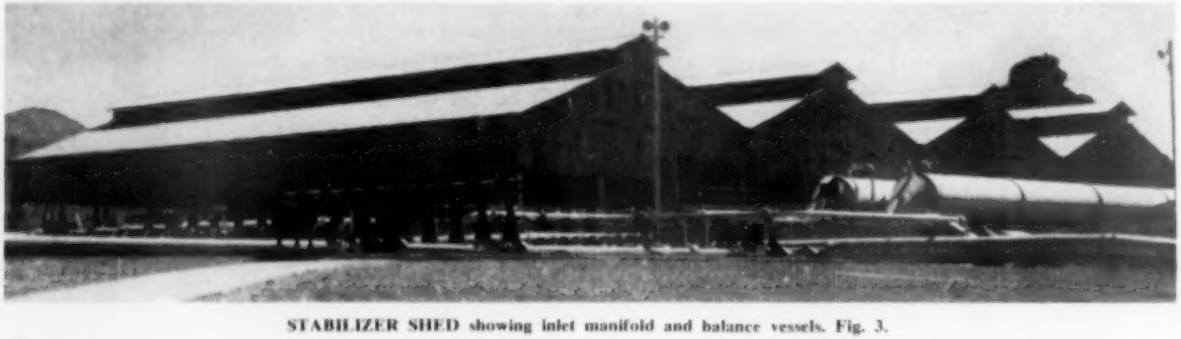
**GAS-OUTLET END of the multistage separation unit. The vessels are 4½ ft. in diameter by 150 ft. long, made up of 25-ft. flanged sections. The ends are conical with a slope of 1 to 21. Fig. 2.**

**Oil transfer** . . . After separation, the crude oil is dispatched to the oil-loading terminal at Mashur by multistage centrifugal pumps. Each has a capacity of 43,000 bbl. per day at 800 psi. The pumps are driven by gas expansion turbines. Each turbine, working at full load, requires about 14 M.M.s.c.f. per day of gas. As shown in Fig. 1, this gas is obtained from the first and second-stage separators. Before entering the turbine, the gas is preheated to 270° F. to prevent freezing conditions at the turbine exhaust.

The crude is delivered to the loading terminal at Mashur, a distance of 45 miles, and also to the refinery at Abadan, a distance of 100 miles. At present, there is a single 16-in. oil line from the No. 2 production unit. This joins the main pipeline system at a point about 19 miles from Agha Jari.

**THE AUTHOR**

**Morteza Khosrovi joined the company in 1930, and was first posted to process operation duties in Abadan refinery, S. Iran. After periods of training in England, he was transferred to the production department of the Oilfield Organization, and has had posts in all the main oil fields of South Iran. In 1952, he was appointed chief production superintendent on the staff of the general fields manager, and currently holds this post, in which he is responsible for the operation of oil production plant throughout the oil fields.**



**STABILIZER SHED showing inlet manifold and balance vessels. Fig. 3.**

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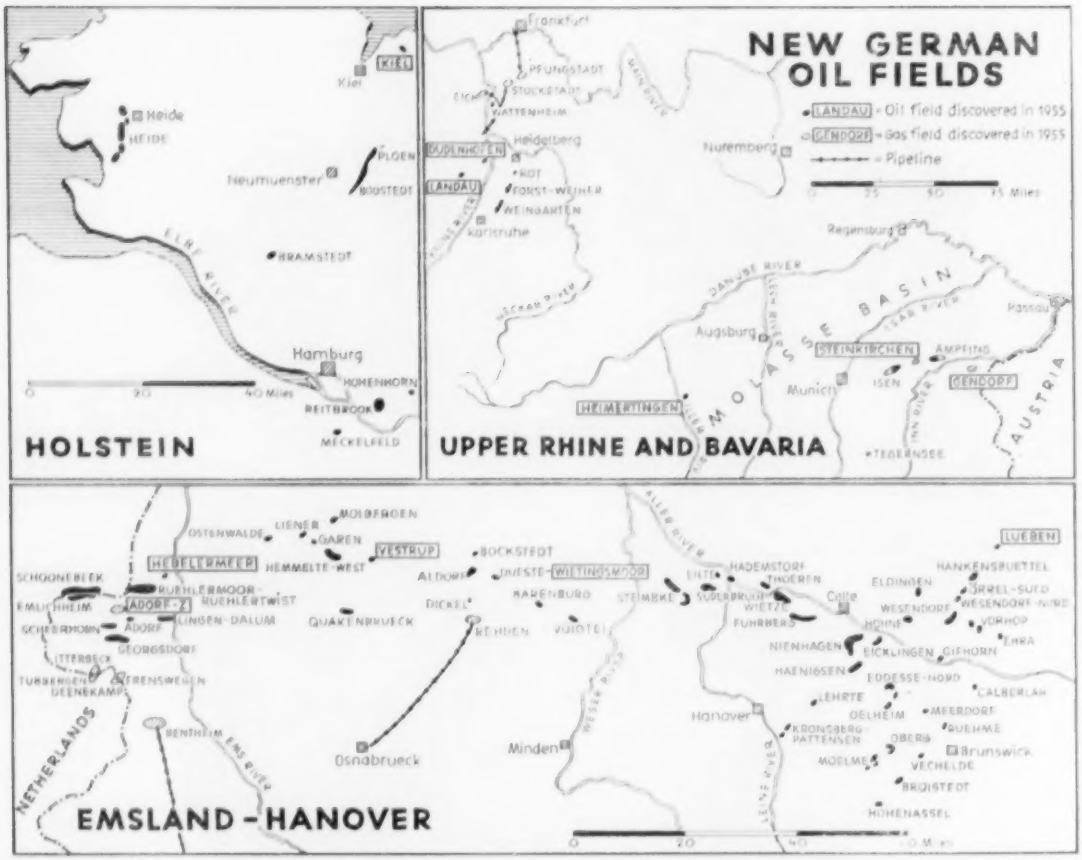


**NEW FINDS were made in all six provinces of West Germany in 1955. Two-thirds of the crude oil produced in the first 10 months was in fields discovered after World War II.**

# West German Oil Continues Its Expansion

**by A. M. Stahmer**

CRUDE-OIL production and refinery capacity of West Germany has been further stepped up during 1955. As result of intensive geophysical research work, mainly reflection seismographing and extraordinarily high drilling activities, 10 new oil and gas deposits were discovered in the first 10 months of the year. The actual production of the oil fields climbed to an average of 63,850 bbl. per day in October, compared with 55,000 bbl. per day in the same month of 1954. For the whole year of 1955 a crude-oil yield of 22.4 million barrels may be expected, and there is good reason to suppose that the country will reach an annual output of about 25 million barrels in 1956.

About two-thirds of the crude-oil production of the first 10 months of 1955 fall to the share of fields which were discovered after World War II. All these new fields are developed very carefully, with full consideration of the reservoir conditions. In some cases secondary-recovery methods were applied in a very early stage to grant a maximum recovery from the oil-bearing formations.

With regard to the exploration of natural-gas deposits, a remarkable progress can be stated as well. The output of the natural-gas fields in the federal Republic was 750 M.M.c.f. in September, as against 183 M.M.c.f. in the same month of 1954. The gas is partly used for heating purposes (steel works) and partly as basic product for the chemical industry.

## New Discoveries

In all six oil provinces of the country new finds were made in 1955.

**Emsland** . . . This district, the biggest producer of West Germany, is located near the Dutch border. Since 1942 several fields with relatively good yields were developed here in an area of only small geographical extent. The chances for further discoveries seemed to be limited but in August Deutsche Schachtbau- und Tiefbohrgesellschaft mbH. came in with the exploratory well Hebelermeer 3, which was located about 2 miles northeast of Ruehlermoor oil field on a joint-interest concession of Deutsche Vacuum-Gewerkschaft Elwerath-Deutsche Schachtbau. The Bentheim sandstone of the Valendis (Lower Cretaceous) was successfully tested at a depth of about 3,950 ft. The well flowed 150 bbl. of crude oil (specific gravity 0.876) per day through a 1/6-in. choke. In October it yielded a total of 1,870 bbl.

As per its structure, Hebelermeer is a tectonic trap situated at the northern

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## German crude-oil production . . .

(1,000 Bbl.)

| | 1953 | 1954 | Jan.-Sept. 1955 |
|---|---|---|---|
| Holstein | 948 | 1,454 | 1,486 |
| Hamburg | 385 | 409 | 322 |
| Hanover | 6,555 | 6,996 | 5,856 |
| Weser-Ems | 1,189 | 2,265 | 2,379 |
| Emsland | 6,206 | 7,317 | 5,943 |
| Upper Rhine Valley | 257 | 487 | 416 |
| Bavaria | | 2 | 49 |
| Total | 15,540 | 18,930 | 16,451 |

## Its estimated reserves . . .

State as per January 1, 1955
(In 1,000,000s bbl.)

| | Proved | Probable | Total |
|---|---|---|---|
| Holstein-Hamburg | 27.5 | 14.9 | 42.4 |
| Hanover | 117.8 | 43.7 | 161.5 |
| Weser-Ems | 49.6 | 26 | 75.6 |
| Emsland | 137 | 38.3 | 175.4 |
| Upper Rhine Valley | 4.1 | 3.6 | 7.8 |
| Bavaria | .7 | .7 | 1.4 |
| Total | 336.7 | 127.2 | 464.1 |

## Its drilling footage . . .

(1,000 ft.)

| | 1953 | 1954 | Jan. to Sept. 1955 |
|---|---|---|---|
| Exploration wells | 467.6 | 553.9 | 451.4 |
| Extension wells | 376.4 | 447.7 | 286.7 |
| Production wells | 937.2 | 1,129.9 | 1,055.2 |
| Service wells | 9.4 | 32.8 | 70.2 |
| Total | 1,790.6 | 2,164.3 | 1,863.5 |

## And production by companies

| Firms— | Tons |
|---|---|
| Gewerkschaft Elwerath | 613,141 |
| Deutsche Erodoel-AG. | 452,443 |
| Wintershall-AG. | 428,027 |
| Deutsche Vacuum Oel/AG. | 428,027 |
| Preussische Bergwerks-und Huetten-AG. | 276,317 |
| Gewerkschaft Brigitta | 246,306 |
| Deutsche Schachtbau-u. Tiefbrges, mbH. | 202,707 |
| C. Deilmann Bergbau GmbH. | 122,682 |
| International Tiefbohr KG. (Itag) | 13,361 |
| Braunschweigische Bohrges. mbH. | 8,307 |
| Others | 5,783 |
| Total | 2,666,314 |

flank of the Fullen syncline. A second well was sunk about 1,200 ft. to the west, which encountered the Bentheim sandstone 46 ft. higher than in the first well. Tests are under way, which up to now have delivered wet gas only.

While Hebelermeer proved that even the Cretaceous of the small Emsland district is still prospective for further exploration, the gas find of Odorf made in June demonstrated that the deep Zechstein in this area offers further chances for the search for natural gas. Adorf is a joint concession of C. Deilmann Bergbau GmbH., Gewerkschaft Elwerath, Preussag and Wintershall. The discovery well Adorf Z 1 found the main Dolomite of the Zechstein gas bearing between 9,300 and 9,400 ft. Production tests yielded 1.9 M.c.f. of gas daily through a 1/6-in. choke, the wellhead pressure being 278 atm. The gas consists mainly of methane having, however, a content of 15 per cent of carbon dioxide.

An extension of the oldest German gas field, Bentheim, in the Emsland district was achieved by the well Norddeutschland 5 of the joint interest of C. Deilmann-Gewerkschaft Elwerath, which at the end of June struck gas in the Platten Dolomite of the Zechstein between 5,150 and 5,200 ft. This well encountered a new fault block of the Bentheim structure by which the productive area was considerably extended to the west. The wellhead pressure in Norddeutschland 5 was measured at 150 atm.

**Weser-Ems district . . .** The start of regular gas production in Rehden field near Diepholz may be called the main event of 1955 in this province. Through a 37-mile pipeline Rehden delivers at present 380 M.M.c.f. of natural gas per month to the steel works of Osnabruck; the operating pressure is 800 psi.

In the area between the Weser and Ems rivers an oil discovery was made in September at Vestrup. The wildcat Vestrup 1 of the consortship Gewerkschaft Brigitta (Shell and Standard of Jersey) Deutsche Vacuum Oel AG. struck oil at a depth of about 6,200 ft. about 7 miles south of the small town of Cloppenburg. The well, which was located on account of reflection seismic investigations, is situated at the southern flank of a structural uplift. The oil pay is the Kimmeridge (White Jurassic) producing about 90 to 110 bbl. of crude oil per day (specific gravity 0.830). In October Vestrup produced 2,100 bbl.

An extension of Dueste field was achieved in the beginning of 1955, when the exploration well Wietingsmoor 1 on a joint lease of Gewerkschaft Elwerath and Deutsche Vacuum near Dueste encountered oil at a depth of about 2,800 ft. in the Valendis. In October the field section Wietingsmoor delivered 13,000 bbl.

A further extension effected by C. Deilmann and Gewerkschaft Elwerath in Ostenwalde field can be noted, where the Cornbrash sand stone was discovered as new pay between 4,950 and 4,986 ft. by the well Ostenwalde 5. Hitherto at Ostenwalde only the Gigas beds of the White Jurassic and the Wealden were productive.

**The Hanover district . . .** Here, oil with a high gas content was discovered by Gewerkschaft Elwerath at Meerdorf north of Brunswick in December 1954. The oil comes from the Dogger beta, from a depth of 5,570 ft.

Of apparently more economic importance is the promising find which was made at the end of October by the wildcat Lueben 1, some miles northeast of Hankensbuettel field (Hanover). This well, which was located on a joint concession of Preussag-Gewerkschaft Elwerath-Deutsche Vacuum-Itag, encountered the Dogger beta with good oil saturation at a depth of 4,200 ft. A test yielded 125 bbl. per day through a 1/12-in. choke; the crude has a specific gravity of 0.850. Further drilling will prove the extension of this new deposit in the northern part of the Gifhorn-Wittingen trough, where the discovery of the prolific Hankensbuettel field in 1954 already was a very good success.

A remarkable secondary-recovery program was started in old Nienhagen oil field near Celle in April 1955. Five companies which participate in the production of the northern field section have formed a consortship to apply the flooding method.

**Hamburg district . . .** At two points good oil traces were found in the Posidonia shale of the Liassic Epsilon. As a matter of fact, this shale formation, as an international curiosity, already established small oil production at Suderbruch in the Hanover district. Near Hamburg, oil in the Posidonia shale was encountered at Hohenhorn and in a deep well north of Meckelfeld oil field. It is not yet clear whether commercial production can be obtained here.

**Holstein province . . .** Deutsche Erdoel-

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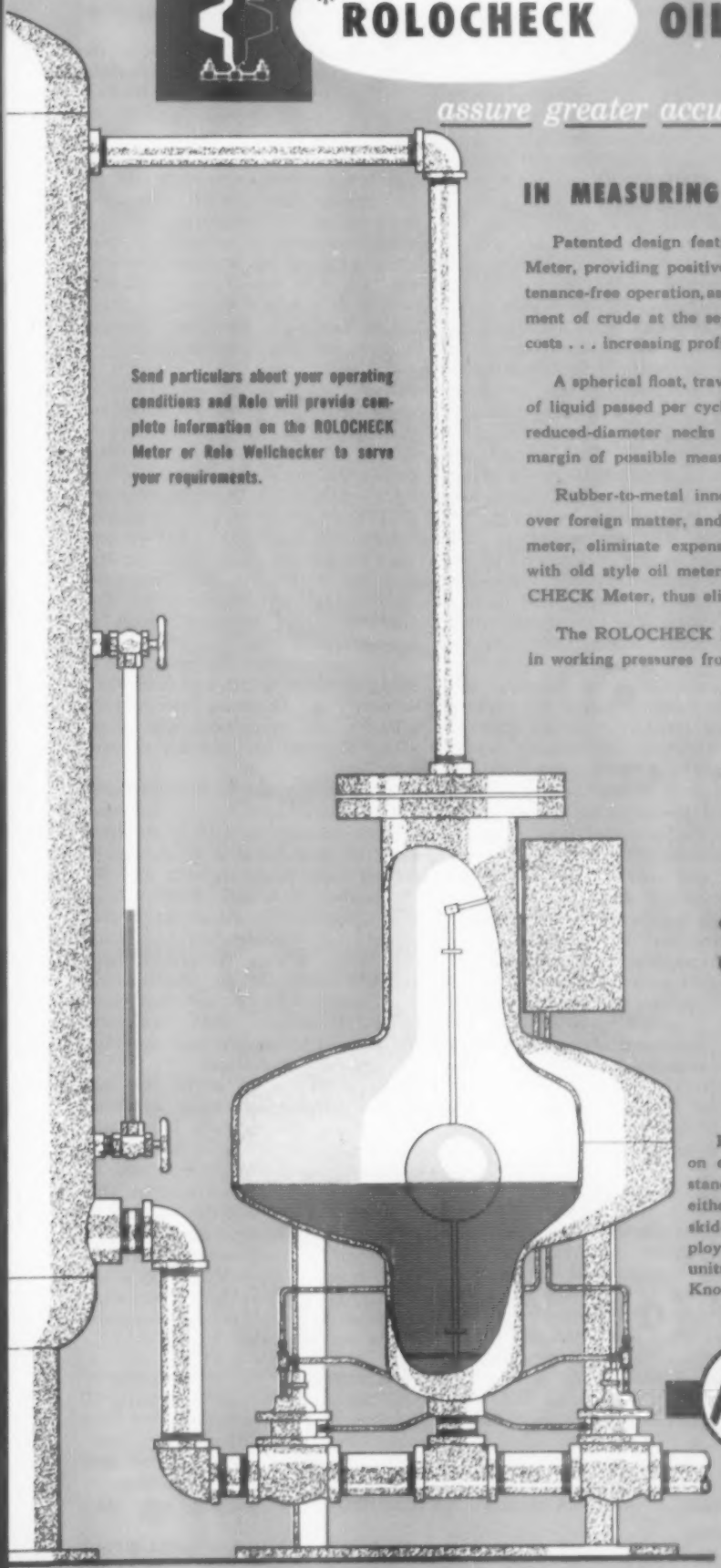

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AG. discovered oil late in April 1955 with its exploration well Kiel 4, which is situated about 9 miles northeast of the town of Kiel. The wildcat struck light oil in sandstone horizons of the Lower Dogger beta between 5,751 and 5,800 ft. After a pump had been installed, the hole produced 60 to 70 bbl. of crude oil per day (specific gravity 0.863). By this discovery for the first time oil was found at the eastern edge of the deep Jurassic trough of Bramstedt-Boostedt-Kiel. In October last, the Kiel oil field, the northern most one of Germany, delivered about 2,600 bbl. from three wells.

**Upper Rhine Valley . . .** An outstanding discovery was made in October when the exploratory well Landau-West 2 of Itag (consortship Wintershall-Deutsche Vacuum-Itag) found some prolific oil horizons of the Pechelbronn beds (the same pay which for decades has been exploited in the old Alsacian field "Pechelbronn," situated some 20 miles farther to the southwest). The past years have brought much unsuccessful and disappointing wildcatting at the Upper Rhine.

Two horizons of the Pechelbronn beds were opened in the well between 5,075-90 ft. and 4,816-29 ft., respectively. These pays produced 180 to 210 bbl. of light crude per day each (specific gravity 0.850) through a 1/6-in. choke. Structurally, the deposit encountered at Landau is situated at a fault zone at the western edge of the Upper Rhine Graben. The structure was detected by means of reflection seismograph work.

A second find at the Upper Rhine made early in May 1955 seems to be of minor importance. It was made in the exploratory well Dudenhofen 1 of the joint interest Deutsche Erdoel-AG.-C. Deilmann, 2 miles west of the town of Speyer, where sands of the Pechelbronn layers were oil-bearing too, at a depth of 6,500 ft. Up to now the output is small.

**Southern Bavaria . . .** This youngest oil province of Germany was further explored in the course of 1955.

In The Oil and Gas Journal's report on German oil developments mention was made of the exploration activities of Deutsche Schachtbau- und Tiefbohrgesellschaft mbH. in the western part of the Molasse basin. While small amounts of Molasse oil had already been produced at Heimertingen in 1954, in July 1955 the extension well Heimertingen 4 of Deutsche Schachtbau situated about 3 miles north of the Bavarian town of Memmingen found commercial quantities of crude at 5,100-5,120 ft. in the Baustein zone of the Suesswassermolasse. In October last, Heimertingen produced 2,900 bbl. of light crude (specific gravity 0.840).

In March 1955 some oil and gas traces were also found by the consortship Gewerkschaft Brigitta-Gewerkschaft Elwerath-Wintershall in the Molasse at Schwabmuenchen, which is situated about 15 miles southwest of Augsburg. Further drilling must prove whether a commercial yield can be obtained here.

In the eastern most part of the Bavarian Molasse basin, where Deutsche Vacuum Oel AG. and Bayerische Mineralindustrie AG. (both affiliates of Socony Mobil Oil Co.), are operating, two gas finds were made in the course of this year. In March, in the district between the two oil and gas fields Ampfing and Isen, east of Munich, a natural-gas deposit was discovered by the wildcat well Steinkirchen 1 of Deutsche Vacuum-BMI in the Rupel sand at 5,470-80 ft., which is the same horizon delivering natural gas in the well Isen 1. First production tests yielded about 100,000 cu. ft. of gas per hour through a ¼-in. choke and about 67,000 cu. ft. per hour through a ⅜-in. choke. The Lattorf sand which was met in this hole at 5,990-6,000 ft., is gas bearing as well.

In October, east of Ampfing field near the Austrian border the exploratory well Gendorf 1 of the joint interest BMI-Elwerath-Preussag struck methane gas in the Burdigal at 3,600 ft. A flow of 30,000 cu. ft. per hour through a 1/6-in. choke was measured, the wellhead pressure being 100 atm. The extension of both deposits, Steinkirchen and Gendorf, has to be defined by further drilling.

For the beginning of 1955 the German Geological Survey made up an estimate according to which the country has 337 million barrels of proven and 127 million barrels of probable reserves. Considering all the new discoveries mentioned above there seems to be no doubt that the reserves figures for January 1, 1956, can be estimated still higher in spite of the fact that about 22 million barrels has been drained from the underground in 1955.

## New Refinery Projects

Just when the original refinery expansion program of West Germany, which had been outlined in close contact with the Organization for European Economic Cooperation (OEEC) in Paris was about completed, new major projects for additional refining capacities were announced by leading oil companies.

**Esso AG.,** German affiliate of Standard Oil Co. (N.J.), is considering erection of a new plant at the Rhine in the neighborhood of Cologne, which with a daily crude intake capacity of 65,000 bbl. would be the biggest oil refinery of Germany.

**Deutsche Shell AG.,** affiliate of the Royal Dutch/Shell-Group, schedules the extension of its Hamburg-Harburg refinery on the opposite side of the Sueder Elbe River to step up the total intake capacity to 56,000 bbl. per day. The building work with Shell Harburg has already been started, comprising the erection of a catalytic cracker with distillation units, a hydrodesulfurizing plant for diesel oil, and two Platformers. The first one of the Platformers with a daily intake capacity of 2,500 bbl. of heavy gasoline (U.O.P. license) is to be put into operation soon.

**Others . . .** A project which was already in the old plans was completed in October, viz. the expansion of the refinery of Ruhrchemie AG. at Oberhausen-Holten (Ruhr-district) with a T.C.C. unit and a 'Perco desulfurizing plant for straightrun gasoline (license Phillips Petroleum Co.). The refinery has a preliminary crude intake capacity of 6,000 bbl. per day. Ruhrchemie has concluded a long-term agreement with Gulf Oil Corp. for the delivery of Kuwait crude.

Last year mention was made here of the expansion of British Petroleum Co.'s refinery at Hamburg-Finkenwerder, where a new Hydrofiner with a capacity of 6,000 bbl. per day is being built now.

The remaining refinery developments can be summed up as follows: The small bitumen refinery of Mawag at Ostermoor on Kiel-Canal is to double its present crude intake capacity to 4,300 bbl. daily. A U.O.P. Platformer is being built on the site of the Deurag refinery at Hanover-Misburg (2,500 bbl. daily), and a Houdriformer of 3,000 bbl. daily capacity is being built by Gewerkschaft Erdoel-Raffinerie, Lingen (Emsland). Esso, Hamburg-Harburg, will soon put into operation an 8,000-bbl. Hydrofiner.

Of special interest is the fact that the Belgian group, Petrofina, which up to now has not yet been represented on the German petroleum market, has acquired 75 per cent of the shares of the Ruhrbau refinery at Muelheim. This small plant which hitherto belonged to Farbenfabriken Bayer, Leverkusen, was shut down. In its present state the refinery is able to top 6,500 bbl. of crude per day. It will probably be modernized and expanded before regular operations will be resumed.

**Total refining . . .** In the beginning of 1955 the total crude intake capacity of the mineral oil refineries of West Germany was 272,270 bbl. per day. Completion of the two projects of Esso and Shell only would mean a rise of more than 100,000 bbl. per day.

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OVER-ALL VIEW of Socony's Naples refinery. At left is T.C.C. unit. Two black towers in center foreground are reactors for cat poly unit. At right center are feed-preparation and gas-recovery plants.

**$27,000,000 AID TO ITALIAN ECONOMY**

# Naples Plant Refining Middle East Crude

Current production rate 60,000 bbl. daily, mostly for export trade

**by G. H. G. Caulton and Staff**
Mobil Oil Italiana S.p.A.

THE history of the Naples refinery goes back 20 years. In 1935 Socony-Vacuum Oil Co. Inc.—now Socony Mobil Oil Co. Inc.—decided that a modern refinery should be erected in Italy, one capable of producing the high-quality lubricants heretofore imported from the United States.

Actually, the work of building a market for high-grade lubricants began in Italy in 1901. Out of this effort grew Vacuum Oil Co. S.p.A., now Mobil Oil Italiana S.p.A. of Genoa. In late 1937, the plant went on stream. It occupied over 62 acres—about 2.5 miles from the Gulf of Naples, about 5 miles from the volcano Vesuvius. Its capacity was about 300,000 tons per year, or about 6,700 bbl. per day.

**War damage . . .** During the war, the refinery was almost completely destroyed by air bombardment and demolition. After the war, prompt steps were taken to rebuild the refinery, and the stupendous task of rebuilding was commenced.

In November 1946 it again went on stream processing 6,700 bbl. a day of crude from the Middle East. In 1948 it was decided that the Naples refinery should become a center for the refining of Middle East crude. This required increasing the capacity of the refinery to 1,600,000 tons per year, or about 35,000 bbl. per day.

### Current Operations

Today the Naples refinery of Mobil Oil Italiana is processing Middle East crude at a rate of 3,000,000 tons per year, or about 60,000 bbl. per day. About 650,000 tons is for Mobil Oil Italiana's domestic requirements, and 2,350,000 are for export for the account of its parent organization, Socony Mobil Oil Co., Inc., of New York, and its United Kingdom affiliates.

The Naples refinery is the first unit in Italy to refine Middle East crude for third parties. This program of "lavorazione per conto," as it is known in Italy, has to date provided the equivalent of 27 million dollars for the Italian economy.

Before this expansion, about 18 tankers a year were enough to serve the needs of the Naples refinery. Today over 500 tankers a year are needed. In fact, the Naples refinery today is responsible for 65 per cent of the ocean freight movement of Naples.

As a result of this traffic, the Port of Naples receives an average annual income of about $1,500,000. This is divided roughly as follows: $500,000 in port dues; $600,000 for fiscal charges; and $400,000 in customs duties. There are many hidden benefits such as expenditures for tanker repairs, ships' supplies, etc., which are occasioned by vessels calling at this port.

The area of the refinery has been increased another 62 acres, making a total of 124 acres.

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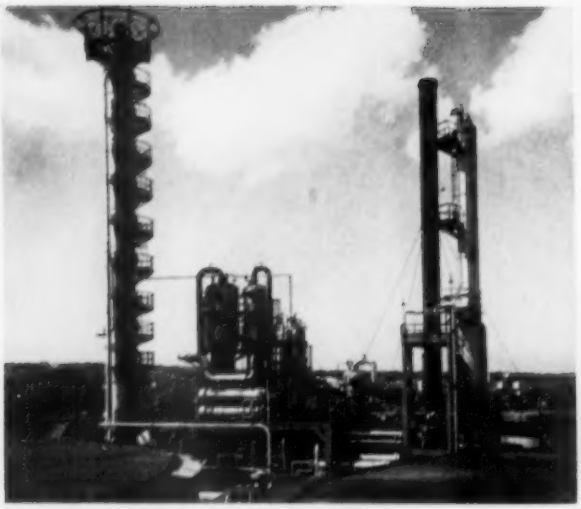


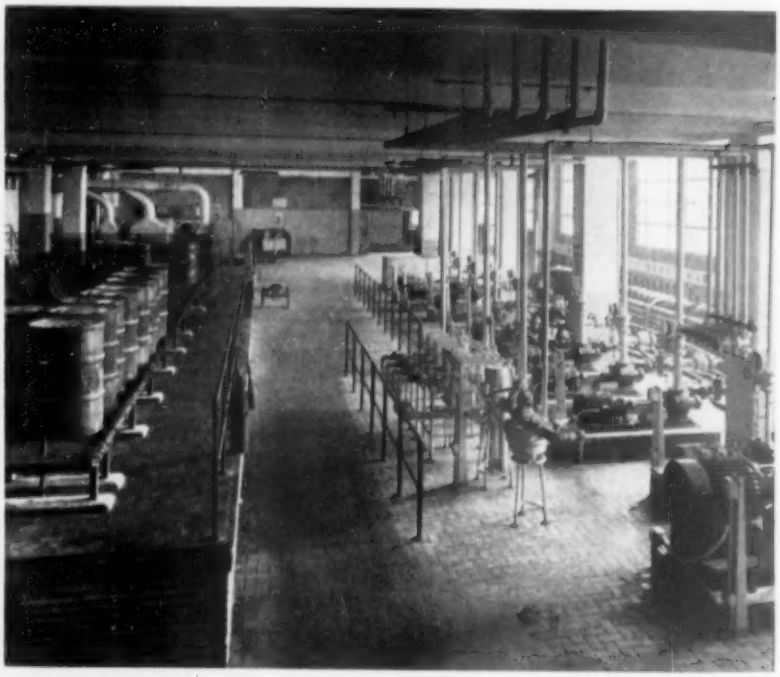
**FURFURAL UNIT is used for producing high-quality lubes. At left is the extractor and at right is the solvent-recovery column. Raffinate is dewaxed in an MEK unit.**

**CRUDE-OIL UNLOADING PIER where two berths are available. Some 170 to 180 tankers are unloaded per year. A 20-in. line connects the refinery with the pier.**

**Operating units . . .** The operating units of the refinery are as follows:

1. Three topping units. Total capacity: 65,000 bbl. per calendar day.
2. One naphtha rerun unit, capacity: 6,500 bbl. per calendar day.
3. One thermal reforming unit, capacity: 7,000 bbl. per calendar day.
4. One thermofor catalytic cracking unit. Reactor capacity: 15,000 bbl. per calendar day.
5. One catalytic polymerization unit. Capacity: 900 bbl. per calendar day, polymer gasoline production.
6. Three stabilizing units.
7. Gas plant.
8. One liquid-phase and one vapor-phase diethanolamine $H_2S$ absorption unit for desulfurization of L.P.G. and refinery gas.
9. Light-oil refining plant for gasoline, kerosine, and jet fuels. Processes used: for gasoline and jet fuels, solutizer and caustic carbon processs; for kerosine, sulfuric-acid treating and doctor process.
10. Gasoline leading and blending equipment.
11. A full lube-processing line including: vacuum distillation; furfurol refining; M.E.K. dewaxing; contact filtering; compounding and blending plant; barrels preparation; package filling. Capacity: 30,000 tons of finished high-grade lubes per year.
12. Grease plant. Capacity: 1,000 tons of greases per year.
13. Asphalt blowing and blending plant.
14. Wax sweating and treating plant.
15. Control laboratory.
16. Utilities. The power plant has an installed capacity of 7,700 kw. and 180 tons steam per hour. The water-treating plant can treat the boiler feed water and the makeup for the refinery cooling-water system. The cooling-water system includes five cooling towers and has a capacity of around 23,000 g.p.m. of circulating water. For plant maintenance: fully equipped mechanical, electrical, and instrument shops are available.
17. Tank-farm and receiving and shipping installations. Crude is received by pipeline from the Naples petroleum pier and pumped to the crude tank-farm from where crude is pumped directly to the topping units. Adequate tankage is provided for finished products. Products for export are loaded through pipelines to tankers in the petroleum basin. Products destined to the Italian market are shipped by rail-tankcars, trucks, or coastwise tankers. Lubes and greases are shipped packaged by rail or trucks.

The total staff of the refinery numbers about 1,250.



**DRUM-FILLING ROOM of the compounding and blending plant. There is also a completely automatic drum-reconditioning plant.**

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VLAARDINGEN TERMINAL of the ferry which crosses the Nieuwe Maas River to Caltex's Pernis refinery. It transports refinery personnel, cars, and tank trucks to and from the plant.

**ONLY THE NAME IS NEW . . .**

# Caltex Completes 50 Years in Holland

**by Daniel S. Kerley**

IN 1947 a new name appeared upon the European scene—"Caltex." Today the name is well known in nine nations of Western Europe where it markets petroleum fuels and lubricants. In all, companies of the Caltex group operate in 67 countries of the Eastern Hemisphere.

One major operation in the Caltex group is located in the Netherlands under the corporate name of Caltex Petroleum Maatschappij (Nederland) N. V. The company is engaged in petroleum refining and marketing operations.

The origin of the company is much older than its name. Created in 1905 when The Texas Co. opened a branch office in Rotterdam, it grew with the petroleum industry and was buffeted by the economic crises of the 1920's and 1930's.

Since Holland was neutral, World War I went by scarcely noticed. But in World War II, the company virtually ceased to exist. Its ocean terminal in Amsterdam was demolished, its barges, railroad cars, tank trucks, and other equipment were confiscated, and its bulk stations were destroyed. Most of the 300 prewar employes were forced into labor battalions, escaped to England, or went underground.

### Postwar Growth

Upon liberation, 250 old employes got together, reconstituted the company, and established contact with its American affiliate. In 1947 it joined the Caltex group of companies along with nine of its European sisters. At that time its name was changed to Caltex Petroleum Maatschappij (Nederland) N. V., otherwise known as C.P.M.

Then began the task of reconstructing bulk terminals and filling stations, and of rebuilding a fleet of barges to course the nation's tracery of canals distributing products. The years 1947-1949 witnessed a climax in the company's growth. Decision was made in 1947 to construct a refinery at Pernis near the city of Rotterdam.

The site selected was a polder, a section of land reclaimed from the sea by the ingenious system of dikes for which the Dutch are noted. Construction was started in 1948 and the refinery began operations in February 1950.

**Foundation work . . .** The Rhine Delta is widely stratified with thick beds of peat which compresses and flows when loaded. Thus, it was necessary to pile all structures with the exception of the storage tanks. Some 3,300 reinforced-concrete piles were required to support process units, shops, and office structures.

Storage tanks, on the other hand, were erected on sand disks. Settlement of the tanks has been somewhat less than that predicted from subsoil test data.

The height of the 78 tanks originally erected was held to 32 ft. by subsoil conditions. Settlement data from nearly 6 years of use, together with new data from test drilling, have indicated that height may be increased to 48 ft. after 5 years' loading.

This period may be reduced by as much as 50 per cent by installing sand piles under the tank to provide more rapid drainage of water from the subsoils under the weight of the tank. The sand-piling technique is being employed for all new tanks erected in Pernis refinery.

### Storage and Processing

About 2,000,000 bbl. of bulk crude and product storage is available in over 100 tanks ranging from 2,500 to 87,500-bbl. capacity. Roughly half of the total storage volume is in crude service. All tanks are cone roof. Floating-roof tanks were not installed owing to the prohibitive cost of heavy pile-supported foundations needed to prevent tilting from unequal settling.

Originally designed for a capacity of 20,000 bbl. per day, the refinery is now operating at 37,000 bbl. daily. The increase was obtained by rearranging equipment to meet increasing market demands and by removing capacity bottlenecks.

The process plants include a two-stage crude-distillation and naphtha-rerun and stabilizing unit, thermal reforming and cracking, $SO_2$ extraction of kerosine, catalytic polymerization of $C_3$-$C_4$ olefins, and lead sulfide sweetening of gasoline, kerosine and jet fuel products.

A utility rerun unit is available for the production of specialty fractions such as tractor-fuel stock obtainable from the kerosine $SO_2$ treatment extract.

Steam power is produced in two 550-psi., 150,000-lb. per hour steam boilers. Electric power is purchased from the municipal power works and is sup-

Author is manager of the Pernis, Holland, refinery of Caltex Petroleum Maatschappij (Nederland) N. V.

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**MOST OF THE PRODUCTS from the Caltex refinery pass through inland canals to bulk oil terminals and distribution centers. Here a barge is going through one of Holland's bascule and cantilever bridges.**

**GRASS AND WEEDS grow thick and fast in fertile soil reclaimed from the sea. Here refinery workers cut grass as a fire-prevention and control measure.**

plied at 25,000 volts. Cooling water for the process units is obtained from the river Nieuwe Mass—the sea-going channel of the Rhine estuary.

**New units . . .** A Unifier-Platformer and a diesel desulfurizer are now being constructed (for 1957 completion) to permit Caltex to satisfy the growing demands for premium engine fuels.

The Unifiner-Platformer will have a design capacity of 7,000 bbl. per day. It will feed raw straightrun or thermally cracked naphtha. Catalyst-poisoning sulfur and nitrogen compounds will be removed from the feed in the Unifiner section of the Platformer unit prior to exposure of the feed to platinum catalyst.

The diesel desulfurizer unit, also embodying Unifining process principles, will have a capacity of 4,000 bbl. per day. It will be operated to produce diesel-engine fuels having sulfur contents ranging from 0.2 to 0.5 weight per cent. The potential feed capacity of the unit increases above the figure just quoted as the sulfur concentration of the product rises above 0.2 weight per cent.

The advent of the two quality-improving units makes a third unit necessary. This is a Claus unit designed to convert hydrogen sulfide to elemental sulfur. Sulfur is at present a costly import commodity, and operation of the Claus unit will help reduce such imports.

**Sales gas . . .** C.P.M. will produce a refinery sales gas. This decision to divert the refinery's available fuel-gas supply to domestic use made necessary the installation of gas compressing, purification, and dehydrating facilities. Design and construction of this equipment as well as facilities for supplying additional steam power and shop and service buildings made necessary by the new extensions to the refinery are now under way.

**Tankers . . .** The crude processed at Pernis refinery is principally Arabian, trasported in Caltex group tankers operating under Dutch registry. Six tankers have been engaged in crude transport service since 1950. Crude is obtained from the eastern Mediterranean terminal of the Trans-Arabian pipeline located in Sidon, Lebanon. Twenty days are required to complete a round trip between Pernis and Sidon.

In April 1956, a 32,500-ton supertanker—the S.S. Caltex Rotterdam—will join the six vessels now making up the Caltex Dutch fleet. This tanker is under construction in the Wilton Fijenoord shipyards in Schiedam, Holland—just across the Nieuwe Maas from the refinery.

Built to serve principally the Benelux countries and Switzerland, the market served by the Dutch refinery now includes the Scandinavian countries and Britain. These markets have their own peculiarities, some due to altitude or climate, others due to tradition.

Twenty products are now being produced. This variety adds many complications to storage, transfer, blending, and shipping. Virtually each of these 20 products must be tailor-made to meet the specific requirements of the consuming country. One gasoline requires additive, another a different additive, another both, the next neither.

Switzerland requires gasoline meeting especially rigorous volatility specifications. These varied requirements obviously place special demands on manufacturers and considerably increase the complexities of blending systems and procedures.

**Inland transport . . .** Eighty-five per cent of the production is moved by barge through canals to bulk oil terminals for inland distribution. The remainder moves by railcar and tank truck. But water transport has its drawbacks, particularly when the quiescent water in the canals freezes during the coldest winter period. At such times, products can no longer be moved inland. Refinery production moves primarily by rail and truck, and in relatively small parcels. Production then backs up in shipping and blending tankage and threatens the continuous operation of the refinery. The only solution to the freezing problem is to add volume to the extensive system of product tankage.

With its widening circle of activity in Europe in all phases of the petroleum business, Caltex has had increasing demands for technical services to its affiliated companies and to its customers. To help meet these increasing demands, plans are being devised and initial construction of a central laboratory adjacent to the Pernis refinery is now under way.

It is planned that these facilities will furnish a technical service center for Caltex operations. Holland was selected as the location of this important new field of service because this nation is roughly the center of gravity for the Caltex European market. Another reason was the concentration of high-caliber educational facilities from which competent engineering scientific personnel are available.

**Fiftieth anniversary . . .** To this list of activities must be added one more. Caltex and its predecessor companies are commemorating 50 years of growth in Holland by beginning construction this year of a new head office building in The Hague.

The growth of Caltex in Holland is measured in the growth of its employe body, which in 1945 numbered about 250; today it exceeds 1,600.

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**EAST TEXAS**

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**OKLAHOMA**

One of seven units owned by an independent in the Tulsa Area, pumping from about 1500 ft. Operator reports production holding up better than offsetting wells with conventional units.

**KENTUCKY**

Carter Unit on 15-ft. substructure in the Green River Bottoms. Operator saved about 50% on substructure cost alone. This is one of seven units owned by this independent.

**NORTH TEXAS**

Major oil company installation in Caddo Field, pumping 30 bbl/day from 6250 ft. No rod failures in more than a year's operation. Total cost about 50% of the cost of a conventional unit.

**CANADA**

Carter Unit operating in 50 degrees-below-zero weather in the Carbondale Field, showing adaptability of Carter Unit to extreme climatic conditions.

**SOUTH TEXAS**

Production increased from 3½ bbl/day to 6 bbl/day on this 2700-ft. well in the Duval County Area, when it replaced conventional equipment. This is one of 11 units owned by this independent.

**WEST TEXAS**

Carter Unit in the Spraberry Area, pumping from 7080 ft. This unit was installed for about 30% of the cost of a conventional unit.

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# Here's how to say it in Arabic...

. . . the official language in eight areas of the world where nearly 3 million barrels of oil is produced daily.

| | ENGLISH TERM | ARABIC EQUIVALENT | PHONETIC PRONUNCIATION |
|---|---|---|---|
| EXPLORATION | Anticline | مرتفع أرضي | Murtafa' Ardhi |
| | Syncline | منخفض أرضي | Munkhafadh Ardhi |
| | Fault | زلة أرضية | Zahla Ardhiyah |
| | Formation | طبقة رسوبية | Tabaka Resobiya |
| | Sandstone | حجر رملي | Hajar Ramlee |
| | Limestone | حجر جيري | Hajor Jeeree |
| | Shale | صخر طفالي | Sakher Tufali |
| | Core | لب | Lubb |
| | Sample | عينة | Ay-yinah |
| | Porosity | مسامية | Masamiy-yah |
| | Permeability | نفاذية | Naf-fadhiyah |
| | Saturation | تشبع | Tashab-buh |
| | Reservoir | مخزن | Makhzan |
| | Log | سجل | Sijil |
| | Seismograph | آلة لقياس الاهتزازات الأرضية | Alat Kiyas Al-Ihtizazat Al Ardiyah |
| DRILLING | Drill pipe | أنبوب الحفر | Unboub Al Hafr |
| | Casing | تغليف | Taghleef |
| | Tubing | تركيب الأنابيب | Tarkeeb Al Anabeeb |
| | Rotary table | المنضدة الدوارة | Qurs Rahwi |
| | Swivel | مرواد | Mirwad |
| | Draw works | آلات السحب | Aalat Es-Sahb |
| | Crown block | البكرة التاجية | Al Bakara Al Taajiyah |
| | Hose | خرطوم | Khartoum |
| | Bit | مثقاب | Mithkab |
| | Engine | آلة | A'ala |
| | Motor | محرك | Muharrik |
| | Elevator | مصعد | Mis-aad |
| | Tongs | ملقط | Milkat |
| | Slips | مزالق | Mazalik |
| | Mud | طين | Teen |
| PRODUCTION | Valve | صمام | Samman |
| | Choke | سداد الخنق | Sad-dadah |
| | Separator | فاصل | Fasil |
| | Packer | حاجز | Mo-ab-bi |
| | Flow | سيل | Sayl |
| | Pump | مضخة | Midakh-kha |
| | Swab | مصة | Mimsaha |
| | Gas-oil ratio | نسبة الغاز للزيت | Nisbat Al Gas Liz-Zait |
| | Compressor | مكبس | Makbas |
| | Gas Drive | دافع الغاز | Dafi' El Gas |
| | Water drive | دافع الماء | Dafi' El Ma |
| | Gravity | جاذبية الأرض | Jazibiyat El Ardh |
| | Emulsion | مستحلب | Mustahlab |
| | Gage | مقياس | Mikyas |
| | Pressure | ضغط | Dught |
| TRANSPORTATION—REFINING | Pipeline | خط الأنابيب | Khat Al-Anzbib |
| | Tanker | ناقلة بترول | Nakilat Zait |
| | Pump station | محطة الدفع | Mahatat Dafi |
| | Distillation | تقطير | Taktir |
| | Fractionation | تجزئة | Tajziyah |
| | Treating | معالجة | Mu'alajah |
| | Still | انبيق | Inbeek |
| | Tower | برج | Burj |
| | Vessel | إناء | Ina' |
| | Heat exchanger | مبادل الحرارة | Mubaddel El Harar |
| | Condenser | مكثف | Mukath-thif |
| | Gasoline | بنزين | Benzine |
| | Naphtha | نفتا | Naphtha |
| | Fuel oil | بترول وقود | Zait Wakud |
| | Residual | مادة متبقية | Madda Mutabaqiya |

# You, too, can learn Arabic

**by Paul Swain**
**International Editor**

OIL development in the world has been the result of western man's vision and ingenuity and it has very largely taken place in the English and European-language areas of the world.

Today, this picture is changing as Middle East oil exerts its influence more and more on the world's petroleum picture. Today about 20 per cent of the world's daily production of oil is produced in Arabic-speaking countries of the Middle East and North Africa. This makes Arabic second only to English and Spanish as an oil language.

In eight distinct areas of the world where slightly less than 3,000,000 bbl. of oil is produced daily, Arabic is the official language. This has meant that English-speaking oil-company personnel have had to adopt the language. The Arabs themselves have taken to English, in addition to French, Spanish, and other European languages. But Arabic is the native tongue and it has spawned its own oil language as demonstrated in the Arabic Glossary of Oil Terms on the facing page.

The Arab world contributed something vital to the oil industry long before oil was discovered beneath its wind-swept sands. The modern oil industry with all its mathematics and engineering would be in difficulty without our system of Arabic numerals. Life in general is simpler because of the Arabic world's contribution to mathematics. The simplicity of the numbers that have evolved from the Arab mathematician Al-Khwarizimi revolutionized the mathematics of the western world. Without the Arabic zero or cipher, from the Arabic word sifr, mathematics as we know it today would be hopelessly complicated.

The Arabic language is something else again. It is essentially alphabetical in system, but it has many sounds not found in English. Learning Arabic, as many English-speaking oil men have had to do, is not an easy chore, but many have done it. The oil companies operating in the Arabic world urge their personnel to learn Arabic. It is politic to do so. Nothing is quite so flattering as the efforts of a stranger to speak your native tongue no matter how haltingly. It is an investment in human relationships in an area where such relationships are not too difficult to strain.

Arabian American Oil Co. is an example of an oil company with an Arabic-language problem. Aramco urges its English-speaking personnel who go to Saudi Arabia to become familiar with the Saudi tongue. It furnishes its people with instruction in Arabic, making use of phonographic records to enable the student to pick up the sounds more easily.

Coping with Arabic, an English-speaking person at first has trouble not only in making the proper sounds, but also in hearing them. A common experience is to find gaps in the words even after the basics of Arabic have been mastered. These gaps are the points at which new, strange sounds occur.

The shapes of Arabic letters are all new, different, and strange to one accustomed to any western language. The letters run from right to left—in other words, backwards to us. Vowels are not normally written and a thorough knowledge of Arabic grammar is necessary before reading can come easily.

The Arabic alphabet contains 28 consonants. Sixteen of these represent sounds which are similar to English sounds of the letters b, d, f, g, h, j, k, l, m, n, r, s, t, w, y z. Three more represent English sounds which are spelled with two letters as in the words **th**aw, **th**en, and **sh**een. Five letters of the alphabet have sounds unfamiliar to English, but are somewhat like d, h, s, and t. Writing phonetic Arabic in English, these letters are usually written as capitals.

Three letters of the Arabic alphabet are completely strange to English. They are usually represented in English by kh, ', and gh. The first letter is alif and does not always represent a single sound.

The shape of written Arabic letters varies a great deal. The shape depends on whether or not it is connected with preceding or following letters. The sixth letter of the Arabic alphabet, spelled Haa in phonetic English, is described by Aramco as a loud pant, somewhat like the sound you might make blowing on your glasses to fog them so they'll clean better.

The fifth letter of the alphabet, spelled khaa phonetically, is a downright unpleasant sound to the uninitiated. It sounds very much like a cough designed to clear your throat, like the ch sound in Scotch loch or German doch.

Arabic is a consonant language. In writing Arabic, the vowel sounds are written almost as afterthoughts, either above or below the line of consonants which are joined together. The vowel sounds are included only in fully written texts, or else when necessary to make a clear distinction between similar words. In most printed material, the vowels are not added.

# FRACTURE
# ACIDIZE
# SWAB *and* TEST

## as many intervals as required

## ... *in one round trip*

*Product No. 677-C*

## *with* BAKER RETRIEVABLE BRIDGE PLUG *and...*

**SETS AND PACKS OFF AGAINST PRESSURE DIFFERENTIALS FROM EITHER ABOVE OR BELOW**

After the Retrievable Bridge Plug has been run to the desired depth and released, it will automatically set and pack off against pressure differentials established from either above or below the tool.

**CAN BE RUN IN AND RETRIEVED EASILY... OR MOVED AND RESET AS MANY TIMES AS REQUIRED**

The number of times that the Retrievable Bridge Plug can be released, moved and reset is limited only by the number of operations in the well that require its use.

**NUMEROUS ECONOMICAL APPLICATIONS**

Used WITH the Baker Full-Bore Retrievable Cementer for:

(a) *Straddle Operations*
The distance to be straddled is not limited by the made-up length of tool.

(b) *MULTIPLE Zone or Selective Testing, Fracturing, Acidizing*

Used BY ITSELF for:

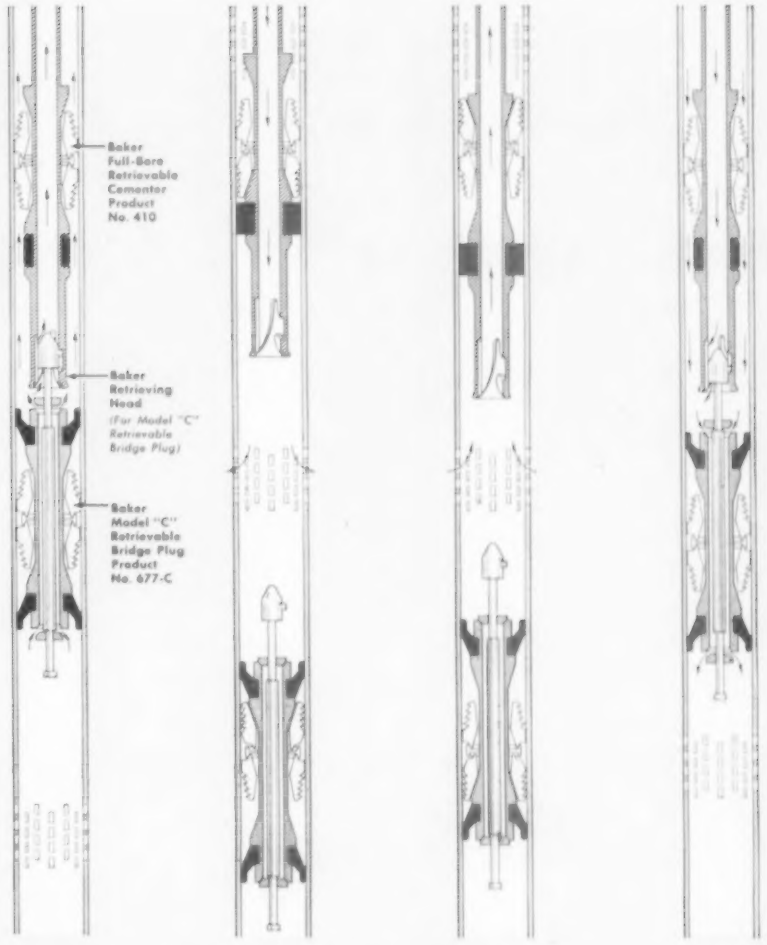
(a) "Down-the-casing" Fracturing or Acidizing

(b) Testing operations

(c) Temporary pressure containment to permit repair to or removal of well head equipment with safety.

*Write for Catalog Supplement No. 319 for complete information on*

TYPICAL OPERATION


Baker Full-Bore Retrievable Cementer Product No. 410
Baker Retrieving Head (For Model "C" Retrievable Bridge Plug)
Baker Model "C" Retrievable Bridge Plug Product No. 677-C

**RUNNING-IN**
Retrievable Bridge Plug being run into well on bottom of Full-Bore Cementer through use of Retrieving Head. Note fluid by-pass.

**FRACTURING OR ACIDIZING**
Plug should be pressure tested after release. Cementer is released, raised above perforations and reset for pressure operations.

**SWABBING, TESTING**
Note how the reversal of pressure differential has transferred load from one set of slips to the other (both cementer and plug).

**RETRIEVING**
Plug and Cementer being moved to next set of perforations—or retrieved from well. Valves in plug open to permit fluid by-pass.

*Product No. 410*

# BAKER FULL-BORE RETRIEVABLE CEMENTER

**HOLDS PRESSURE FROM EITHER ABOVE OR BELOW**

Two sets of opposed slips enable the cementer to hold pressure from either above or below. Casing can be tested before squeeze—and the tubing also, if the Baker Full-Bore Tubing Tester is used.

**FULL BORE CONSTRUCTION**

*Permits Passage of Tubing Perforators or Instruments—Assists in Preventing "Screen-Out" on Fracturing Jobs*

The Full Bore through the Cementer (and Tester if used) is in reality a continuation of the bore through the tubing.

This continuous full ID passage not only permits passage of tubing perforators or instruments but assists in preventing "Screen-Out" (sand dropping out of the oil) and subsequent plugging of the tubing in fracturing jobs.

**IDEAL STRADDLE TOOL WHEN USED WITH BAKER RETRIEVABLE BRIDGE PLUG**

The operation of the Cementer setting mechanism makes it easy (through the use of the Retrievable Bridge Plug Retrieving Head) to release and pick-up the Baker Retrievable Bridge Plug. It is in fact the ideal partner to the Retrievable Bridge Plug for selective multiple-zone or single-zone operations.

*these products and their application*

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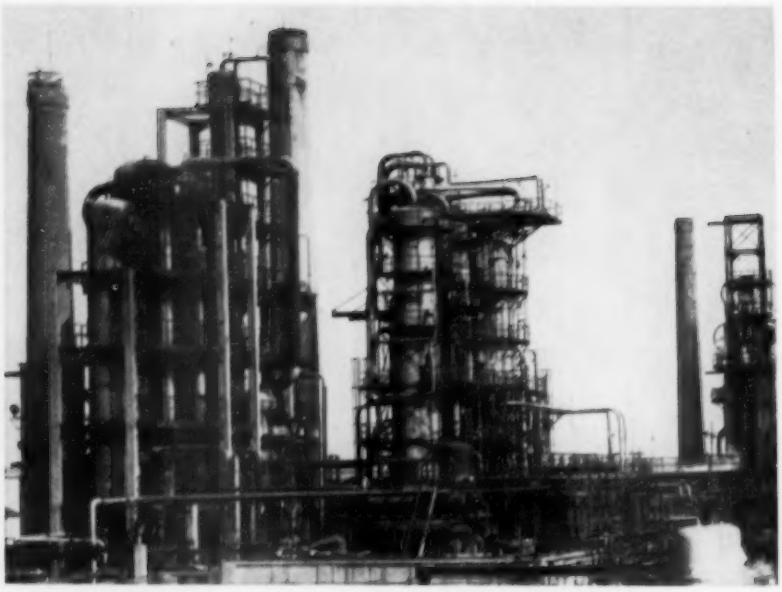

**KAWASAKI REFINERY is currently processing close to 20,000 bbl. daily. In 1954 a Platforming unit, furfural solvent-extraction and M.E.K.-toluene solvent dewaxing units were completed.**

# Kawasaki Refinery Expands More Than Fivefold in 5 Years

MITSUBISHI OIL CO. owns and operates a refinery in Ogimachi, Kawasaki City, Kanagawa Prefecture. The refinery is located just between Tokyo and Yokohama, the largest industrial center of Japan.

It covers an area of 63 acres and its harbor facing Tokyo Bay can berth 20,000-ton d.w. tankers.

The postwar reconstruction of the refinery has brought the throughput capacity to 26,730 bbl. per calendar day as of April 1, 1955, from less than 5,000 bbl. in 1950.

In line with such a rapid gain of the throughput capacity, crude processing has recorded a constant increase.

### Product Quality

Improvement of product quality has been brought about. The furfural solvent refining unit and M.E.K. Toluene solvent dewaxing unit were completed in May 1954. Simultaneously completed were clay treating unit, blending unit, and filling facilities for lube oils.

A Platforming unit was completed in August 1954 and is recording good operational results.

Units now under construction are wax treating unit and wax molding unit. Another Platforming Unit (3,000 bbl. daily) and a Udex Unit (750 bbl. daily) are scheduled for Kawasaki refinery for producing aromatics. This will initiate petrochemical industry in Japan.

The main units are indicated as follows:

Here is a brief description of the main units:

1. Topping and cracking combination unit was designed in cooperation with ALCO of United States and completed in 1939.

2. Topping and vacuum distillation unit (Mitsubishi) has the biggest vacuum tower in Japan, having diameter of 13 ft. 6 in.

3. Topping and vacuum distillation unit (Kellogg) is employed to process California crude, producing common-grade lubricants and asphalt.

4. Topping unit having throughput capacity of 12,000 bbl. daily was completed in April 1954. The unit is the first of the kind in Japan, and has operated well.

5. The Platforming unit recorded over 92 per cent yield of high-octane gasoline from heavy naphtha charged.

6. Lube stock obtained by topping and vacuum distillation unit (Mitsubishi) is charged to furfural solvent refining unit for stabilizing the viscosity of the stocks. Stocks are then charged to M.E.K. Toluene solvent dewaxing unit. High-grade lubricants are obtained by treating the oils with clay and adding specific additives.

**CRUDE THROUGHPUT SINCE FISCAL YEAR 1950**
(M.O.C. Compared with Total Japan)
(Bbl. per Calendar Day)

| Fiscal Year— | 1950 | 1951 | 1952 | 1953 | 1954 | 1955* |
|---|---|---|---|---|---|---|
| Total Japan | 35,931 | 62,042 | 87,530 | 111,078 | 133,442 | 139,589 |
| M. O. C. | 1,979 | 5,215 | 8,485 | 12,279 | 18,105 | 19,298 |
| Percent of M.O.C. against total Japan | 5.5 | 8.4 | 9.7 | 11.1 | 13.6 | 13.8 |

*Figures for April-June, 1955.

**MAIN UNITS OF KAWASAKI REFINERY, M.O.C.**
(as of July 1955)

| Unit— Type | | Capacity bbl./day |
|---|---|---|
| Topping unit, Mitsubishi | | 12,000 |
| Topping and cracking combination unit, Mitsubishi | | 7,400 |
| | Crack. | 3,000 |
| Topping and vacuum distillation unit, Kellogg | Top. | 1,000 |
| | Vac. | 800 |
| Topping and vacuum distillation unit, Mitsubishi | Top. | 9,000 |
| | Vac. | 1,600 |
| Absorbing and stabilizing unit, Alco | | 2,400 |
| Pressure distillate rerun unit, Braun | | 1,600 |
| Platforming unit, UOP | | 1,500 |
| Furfural solvent refining unit, Texaco | | 430 |
| M.E.K. Toluene solvent dewaxing unit, Texaco | | 600 |
| Blown asphalt unit, Mitsubishi | | 350 |
| Grease unit, Kellogg | | 4.5 ton/day |
| Acid-treating unit: | | |
| for straightrun gasoline, Continuous | | 3,200 |
| for pressure distillate, Continuous | | 1,300 |
| for kerosine, Continuous | | 700 |
| for lube oil, Continuous | | 1,300 |
| Clay treating unit for lube oil, Mitsubishi | | 650 |
| *Wax treating unit | | 80 |
| *Wax molding unit | | 60 |

*Under construction.

# When timing is important call on Canada's Oil Bank

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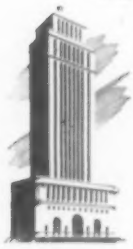
The "Royal's" Oil and Gas Department in Calgary is staffed by men who specialize in all phases of oil and gas financing. They can answer your questions quickly and with authority. Its branches, serving all major producing areas, and many new districts of rich promise, provide complete banking service and a wealth of information at the local level. There are over 280 Branches of this bank in British Columbia, Alberta, Saskatchewan and Manitoba alone. Your enquiries are invited.

We do not supply information on oil securities.



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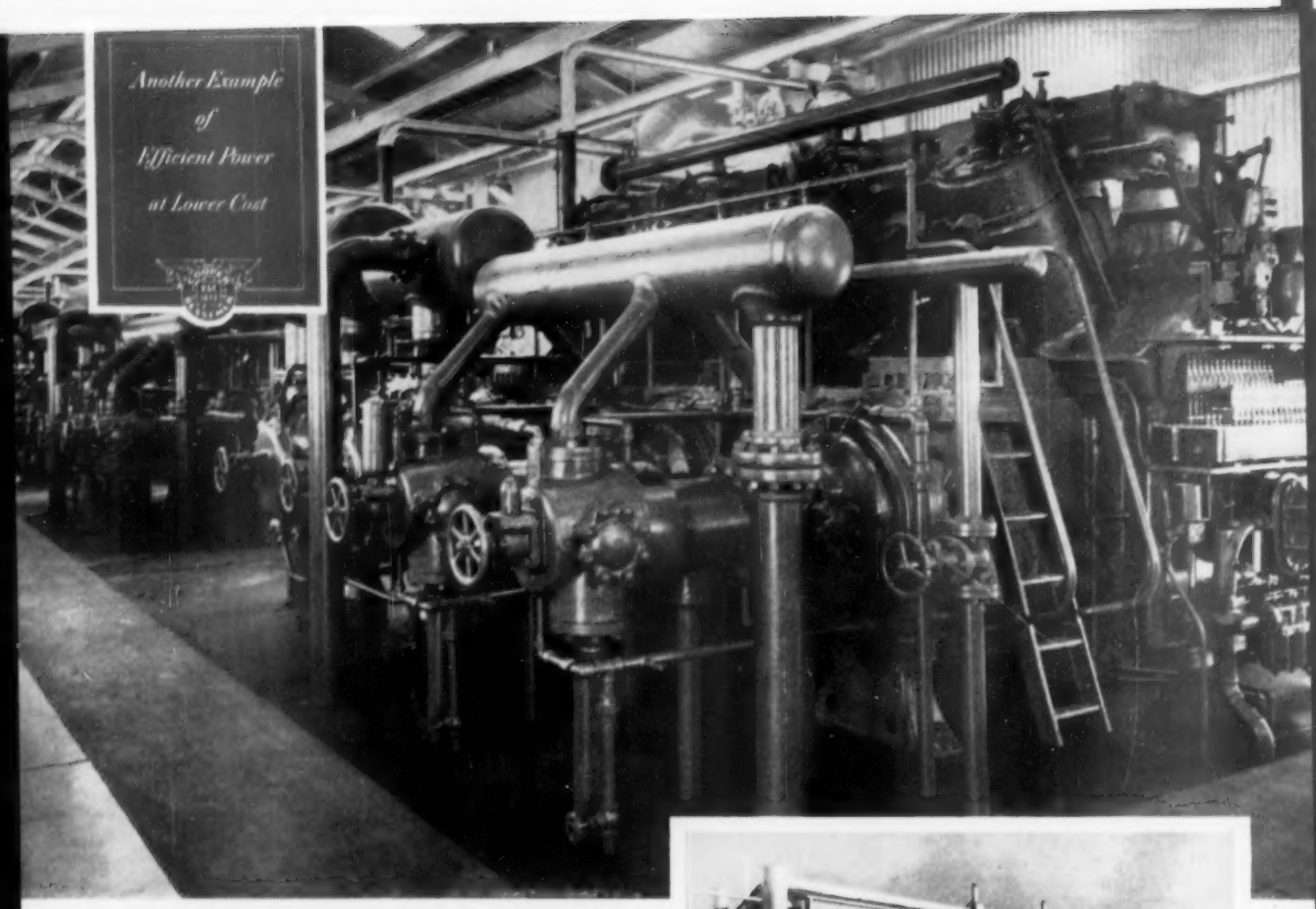

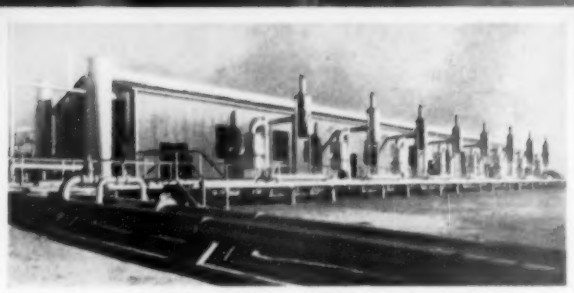

Line-up of eight Cooper-Bessemer 8- and 10-cylinder compressors at Ballinger, Texas. Two GMV-8-TF's are used for propane refrigeration, and injection, while the remaining six compressors are used for plant process gas.

The compact Runnels natural gasoline plant at Ballinger, Texas, contains five Cooper-Bessemer 880 hp GMV-8-TF's, and three 1100 hp GMV-10-TF's, totaling 7700 dependable compressor horsepower. The plant was designed by Messrs. F. M. Seibert and W. H. Woods of Runnels Gas.

# Dependability plus . in the GMV story at Runnels Gas

YES, efficient, trouble-free performance. That's the experience of Runnels Gas Products Company with the eight Cooper-Bessemer GMV's recently installed at their Ballinger, Texas plant. But that's only part of the story . . . expected and counted on with these modern V-angle compressors.

Runnels Gas, a subsidiary of Union Sulphur and Oil Corporation, uses these GMV's for process gas, propane refrigeration, and gas injection in this new natural gasoline plant of theirs. And they, like so many Cooper-Bessemer customers, have made a point of expressing appreciation for the detailed installation recommendations of C-B service personnel . . . and also for the availability and rapid delivery of needed spare parts. This sort of cooperation is mighty important in *any* kind of engine or compressor application.

Next time your plans call for compressors up to 2500 bhp, check on Cooper-Bessemers.

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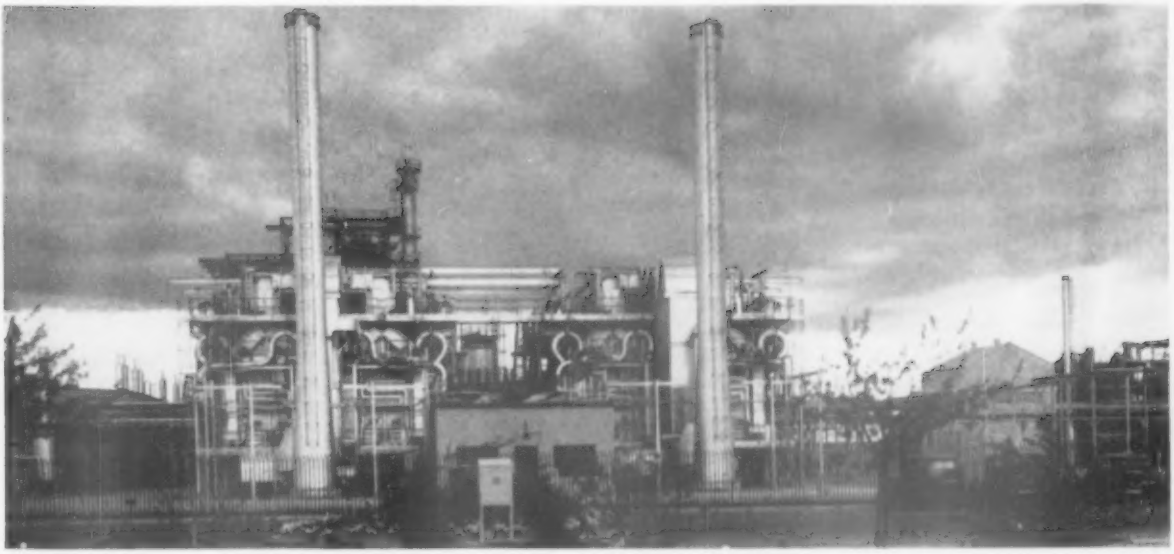
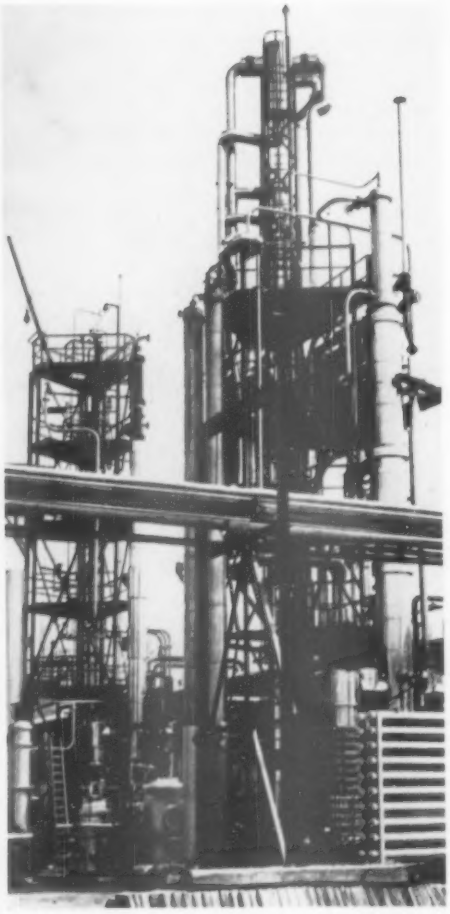
DIESELS • GAS ENGINES • GAS-DIESELS • ENGINE-DRIVEN AND MOTOR-DRIVEN COMPRESSORS



BRITISH PETROLEUM CHEMICALS . . . These are furnaces of the the No. 1 cracking unit at Grangemouth, producing ethylene, propylene, etc.

# Western Europe's Petrochemical Program Has Three Prime Targets . . .

1. To replace imports from the dollar area
2. To substitute raw materials formerly produced by more expensive techniques
3. To augment existing range of chemical raw material and intermediates



ROYAL DUTCH-SHELL . . . The new PVC plant, Pernis refinery, Holland, reacts ethylene with chlorine to give dichloroethane. This is purified, evaporated, and decomposed to form vinylchloride and HCl. Polymerization of vinylchloride results in the polyvinylchloride plastic.

THE postwar years have witnessed the growth of considerable petrochemicals industry in Western Europe following the spectacular oil-refinery expansion program, thanks to Marshall aid coordinated by OEEC and supplemented by local oil and gas discoveries.

This vastly augmented petroleum-processing business envisaged three goals: (1) replacing imports from the dollar area, (2) substituting raw materials formerly produced by more expensive techniques, and (3) augmenting the existing range of chemical raw materials and intermediates for which petroleum is either the only or the most suitable source.

Countries participating in the petrochemical field are naturally those possessing substantial processing capacity employing fluid catalytic cracking, Platforming, and kindred techniques, yielding valuable byproduct gases, like the United Kingdom, France, Western Germany, the Banelux area, and Italy.

### Production

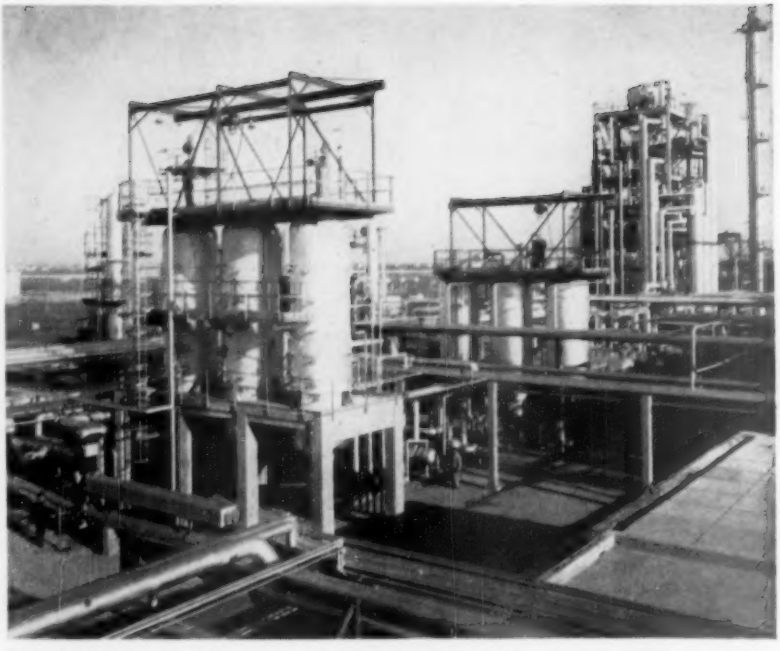
So far the most far-reaching developments pertain to the production of synthetic detergents, industrial solvents, plastics, fibers, and insecticides.

The combined output of the Western European petrochemical industry in 1953 was of the order of 550,000 long tons (about 1.23 billion pounds), and this is reckoned to go up to 900,000 tons (slightly over 2 billion pounds) in 1957. Basically, it has been built on

the basis of special cracking and reforming plants, designed to achieve maximum olefin production from liquid petroleum fractions, on byproduct gases and residues (slack wax) of refining, and, to a minor extent, on natural gas.

### France

At the end of 1954 France had a crude-distillation capacity (annual) of 26,760,000 metric tons (545,000 bbl. per day), while its cracking and reforming capacities (in 1,000 tons per year) were: thermal cracking, 3,320 (roughly 60,000 bbl. per day); thermal reforming, 925 (roughly 20,000 bbl. per day); catalytic cracking, 2,824 (roughly 58,000 bbl. per day), and catalytic reforming 225 (roughly 5,000 bbl. daily). The French refineries processed 23,838,000 metric tons (485,000 bbl. daily) of crude oil in 1954, of which 68 per cent was absorbed by the home market and bunkers, 10 per cent by French oversea territories, and 22 per cent went to foreign destinations.



**MONTECATINI . . . At the Ferrara works, polyethylene and polystyrene plastics are made, as well as solvents, plasticizers for PVC, and Terylene synthetic fiber. A portion of the olefin plant is shown here.**

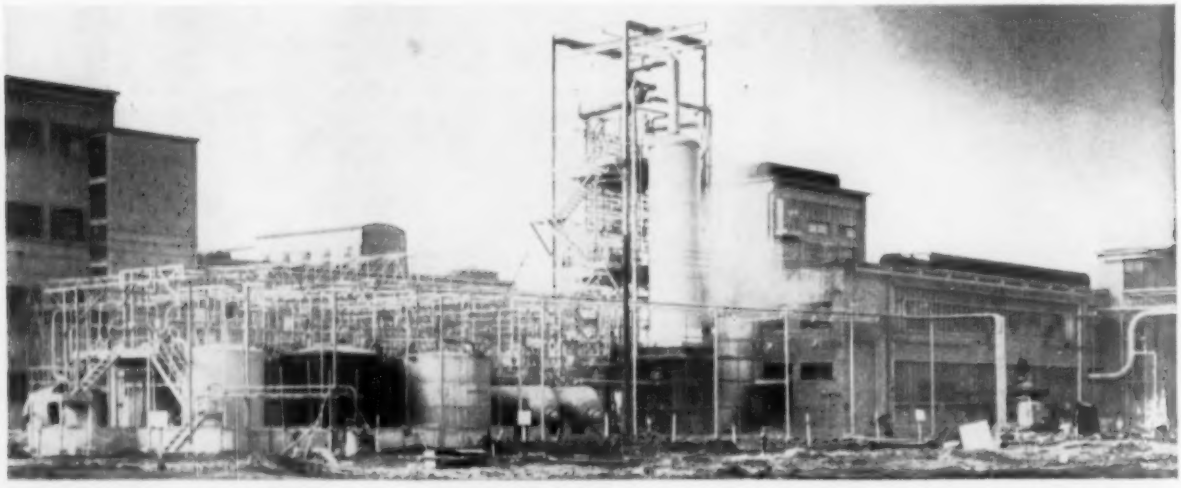
**Oil-chemical mergers . . .** The postwar years have witnessed several marriages between large oil companies and leading domestic chemical undertakings. On the shores of Lake Berre a number of petrochemical plants have mushroomed following joint ventures by Shell and Saint Gobain on the one hand, and by the Societe des Petroles B.P. and Pechiney on the other, the latter linking hands with the Naphtachimie company. The installations commissioned by these groups account for isopropyl alcohol, acetone, and acetone derivatives.

The Compagnie Francaise de Raffinage also operates a refinery on the shores of Lake Berre, and has installed units for manufacturing propylene used by the Society Rhone-Poulenc. This last concern (Phone-Poulenc) recently commissioned the first phenol-cumene plant in Europe in the Rhone Valley.

Other companies in the petrochemical field include Raffineries de l'Atlantique at Donges with the Society Progil Electrochimie (Progil and Ugine), and the Standard with Kuhlmann at Estaque adjoining Marseilles.

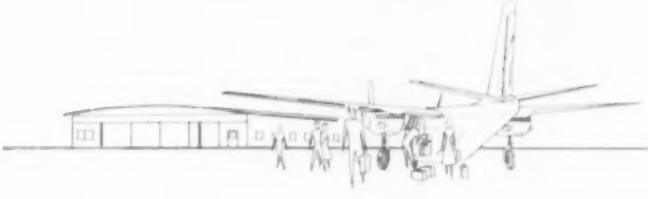
**Synthetic ammonia . . .** Nitrogen production has also gained from the advent of oil refining and discovery of natural gas. Before the second world war, synthetic ammonia was derived exclusively from coke, but now new and more economic raw materials are being employed—gas from petroleum processing plants and natural gas from Saint-Marcet, apart from coke-oven gas furnished by Houilleres du Nord et de Lorraine.

**Perchloroethylene . . .** Although acetylene is still widely used as raw material for producing chlorinated compounds it is losing ground at least in the case of perchloroethylene prepared through the direct chlorination process.



**IMPERIAL CHEMICAL INDUSTRIES . . . A capacity of 11,000,000 lb. per year of Terylene in the original I.C.I. plant at Wilton has been doubled with completion of a second plant in 1955. Part of the chemical section is shown. Here p-xylene from another section of the Wilton works is converted to terephthalic acid.**

# One Easy Step...



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# TWO GREAT COMMANDERS

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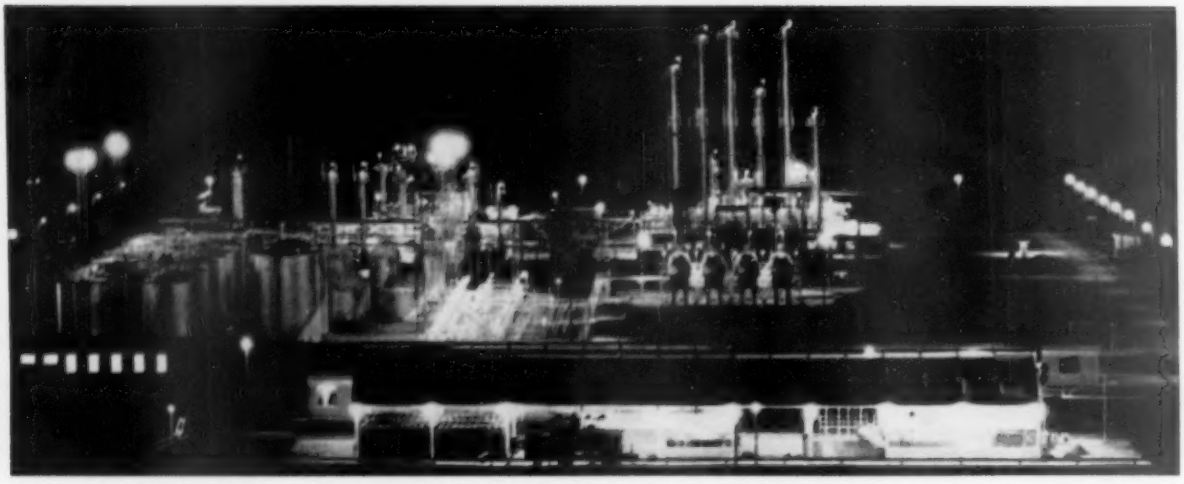

**SHELL AND SAINT-GOBAIN . . . An annual production of 7,500 tons of acetone and other solvents comes from the new petrochemical plant at Berre, near Marseilles. Raw material is propylene from nearby Shell-Berre refinery.**

Perchloroethylene will constitute the major product of the new French installation designed and engineered by Scientific Design Co., Inc., New York, for Pechiney.

**Direct chlorination . . .** The process is based on the direct chlorination of ethane, methane or propane. Its HCl byproduct is to be utilized in an enlarged program for vinyl chloride production. Under conditions where this byproduct can be disposed of profitably the new technique of polychloroethylene production has certain outstanding advantages over the acetylene process. First, the light hydrocarbons needed to prepare a pound of perchloroethylene cost the manufacturer only 25 per cent as much as the equivalent in acetylene. Secondly, there are four steps in the preparation of perchloroethylene from acetylene, viz., acetylene to tetrachloroethane, to trichloroethylene, to pentachloroethane, to perchloroethylene.

When ethane, methane, or propane is used, only one step is taken—the reaction of the gas with chlorine, calling for less equipment, less maintenance, and lower labor costs.

Pechiney's new plant, at St. Auban, is the first in France to employ the direct-chlorination technique. And its fundamental engineering and design features were based on a study made by the scale dimension of a pilot plant of Montecatini Co. Data procured from this Italian installation were adapted to meet the requirements of the French unit. Principal differences pertain to larger scale production and purity of byproduct HCl. Alterations are also being effected to meet an altered pattern of market conditions.

**Synthetic rubber . . .** It was stated in August 1954 that France was taking steps to establish a synthetic-rubber industry. Initial output aimed at is 10,000 metric tons a year (22,050,000 lb. per year) and further expansion is seen. In 1953 France imported 15,000 tons (33,075,000 lb.) of synthetic, and 135,000 tons (297,675,000 lb.) of natural rubber. This project is sponsored by the French Dunlop company, Michelin, Pechiney, Esso-Standard, the Compagnie Francaise de Raffinage, and Kleber-Colombes.

Rhone-Poulenc Co. is erecting a new factory in the Upper Rhine Department for the production of plastics and nylon. It is to be commissioned in late 1956.

The Compagnie Francaise de Raffinage and the Societe A.P.E.C. have linked with U. S. Oronite Chemical Co. to form Petrosynthere for the man-

**TABLE 1—STATUS OF THE FRENCH PETROCHEMICAL INDUSTRY**

| Company, raw material, and major products— | Metric tons/year | Lb./year |
|---|---|---|
| Naphtachimie (Lavera)—Ethylene: | | |
| Ethylene oxide | 6,000 | 13,230,000 |
| Glycol | 2,500 | 5,512,000 |
| Ethanolamines | 2,500 | 5,512,000 |
| Glycol ethers, etc. | 1,000 | 2,205,000 |
| Naphtachimie (Levera)—Propylene: | | |
| Acetone | 5,000 | 11,025,000 |
| Isopropanol | 9,000 | 19,845,000 |
| Shell-St. Gobain (Berre)—Propylene: | | |
| Isopropanol (yielding): | | |
| Acetone | 7,500 | 28,665,000 |
| Diacetone alcohol | 1,000 | 2,205,000 |
| Butyl acetone, etc. | 2,500 | 5,512,000 |
| S.I.D.A., etc.—Butylenes: | | |
| Butanol-2 | | |
| Shell-St. Gobain—Higher olefins: | | |
| Methyl-ethyl-ketone | | |
| Petit-Couronne—Higher olefins: | | |
| Teepol (detergent) | 60,000 | 132,300,000 |
| Standard-Kuhlmann (L'Estaque)—Aromatic alkyls: | | |
| Stanyl (detergent) | 9,000 | 19,845,000 |
| Pechiney S.G.H.P. (Saint-Auban)—Aliphatics: | | |
| Alalpol (detergent) | | |
| A.P.E.C. and Pec (Pont-de-Claix)—Propylene, benzene, and cumene: | | |
| Cumene | 9,000 | 19,845,000 |
| Acetone | 3,000 | 6,615,000 |
| Phenol | 5,000 | 11,025,000 |
| Rhone-Poulenc (Peage de Roussilon)—Propylene, benzene, and cumene: | | |
| Cumene | 13,000 | |
| Acetone | 5,000 | 11,025,000 |
| Phenol | 8,000 | 17,840,000 |

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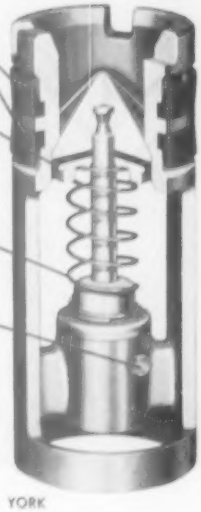

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# BAKER DRILL PIPE FLOAT VALVE

ufacture and sale of dodecylbenzene, starting from propylene, with an annual output of 24,000 metric tons (52,920,000 lb.).

The status of the French petrochemical industry is summarized in Table I.

### Germany

Although undivided Germany pioneered large synthetic materials industries based on coal, until recently Germany lagged behind in the petrochemical field for understandable reasons. The production of chemicals from oil received a stimulus following the country's postwar refinery expansion, as well as the discovery and development of domestic oil and gas fields.

**Refining capacity . . .** West Germany's current refinery capacity is 12,000,000 metric tons a year (around 250,000 bbl. per day) and the refinery throughput in 1954 was 8,600,000 tons (around 180,000 bbl. daily). At the end of last year its capacity for thermal cracking was around 1,120,000 tons (20,400 bbl. daily) and catalytic cracking 2,500,000 tons (51,000 bbl. per day). These units yield olefinic hydrocarbons—a promising potential source of petrochemicals. Moreover, heavy-oil hydrogenation is yielding substantial quantities of L.P.G., also utilized as raw materials for preparing petrochemicals.

**Olefins . . .** Dr. W. A. Menne, president of the Association of Chemical Industry in the Federal Republic, stated in mid-1954 that the output of olefins—ethylene, propylene, and butylenes—from domestic cracking operations was reckoned to total 1,125,000 bbl. in that year. He believed that ethylene, derived from oil and gas sources, would find its greatest outlets in the production of ethylene oxide, ethylene glycol, and polythene.

Moreover, three former coal-hydrogenation plants at Gelsenberg, Wesseling, and Scholven are contributing 25,000 tons a year of saturated hydrocarbons from the high-pressure hydrogenation of oil residues.

There is, furthermore, a potential petrochemical source for benzene in the country's catalytic reforming capacity. There are three U.O.P. Platformers in West Germany, which could be operated to yield benzene, toluene, and xylenes. Their combined charging capacity is 15,600 bbl. per day. Two more Platformers are being built at Harburg by Shell.

**Polythene . . .** Germany's first polythene plant was commissioned on September 29 last at Wesseling on the Rhine. It is jointly owned by Badische and the Shell group. The designed initial capacity is 6,000 metric tons (13,230,000 lb.) a year, and production by the existing unit can be stepped up to 10,000 tons (22,050,000 lb.), while a further extension of the installation is envisaged.

Up to now this technique has been applied only at Ludwigshaven using coke-oven gas as raw material. The switch to petroleum-refinery gas permits production to be stepped up. As a byproduct the Wesseling factory produces ethyl benzene, which is barged up the Rhine to Ludwigshaven to serve as raw material for other plastics.

**Ziegler low-pressure polythene . . .** Another plant, costing 5 to 6 million pounds (British) is being built at Gelsenkirchen to produce 24,000 tons (52,800,000 lb.) of polythene per annum. It is to be commissioned in the spring of 1957. This unit is operated by Kohle-Oel Chemie, in which Farbwerke Hoechst, Mannesmann, and Deutsche-Erdoel have equal interests.

This installation will employ a new technique based on the patents of Professor Ziegler of Max Planck Institute. By using a new type of catalyst, production of polythene is to be effected, at a normal pressure, in contrast to the I.C.I.'s high-pressure process (1,000-1,500 atm.). The resulting product, it is predicted, would be cheaper. Professor Ziegler has also granted rights to a second group ("Working Group of Olefin

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*for testing gases under pressure.*

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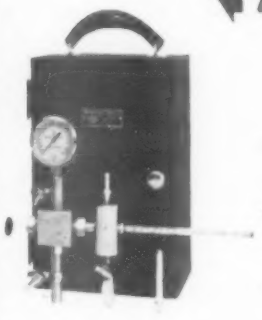

- **PRECISION DETERMINATIONS:** Bureau of mines tests show that with manipulation dew points can be duplicated to within 0.2°F.
- **ACCURACY:** Averaging test measurements, the Bureau of Mines reported less than 0.2°F. Dew point temperature difference compared to known standards.
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Chemistry"), a joint enterprise of several German coal-mining companies.

**One-step butadiene . . .** The first unit in Europe for producing butadiene from normal butane, by the single-step Houdry dehydrogenation process, is to be installed by Chemische Werke Huels A.G. at Marl in West Germany. The planned annual production of 36,000 metric tons (79,300,000 lb.) of butadiene will be used in the manufacture of synthetic rubber, of which West Germany needs 60,000 tons (132,300,000 lb.) a year to meet estimated requirements of around 160,000 tons 354,000,000 lb.) of natural and synthetic rubber annually.

Factors favoring the choice of the Houdry technique were increased production of higher octane gasoline and consequent availability of butane, coupled with the single-step nature of the process.

**Synthetic rubber . . .** The "big-three" of German chemical industry (Bayer, Hoechst, and Badische Anilin) decided in early 1955 to support a large-scale expansion program of synthetic-rubber production. This new buna undertaking is the first joint venture of the indigenous chemical industry since "deconcentration." The German tire factories are understood to play only a minor role.

Under this new setup the annual target is to reach 45,000 metric tons (99,500,000 lb.) by 1958, whereas earlier projects envisaged only 30,000 tons (66,150,000 lb.) a year. And a capital investment of DM. (Deutschmark) 130 million ($31,200,000) is deemed sufficient.

Liquid gas butane-N is to serve as primary material which calls for 75,000 metric tons (158,500,000 lb.). With butane-N in short supply locally and refineries in sufficient numbers not anywhere near Huels Chemical Works, a part of the material will have to be imported.

Arrangements have been concluded with the German affiliates of the Esso and B.P. companies to furnish 60 per cent of the needed butane, as the prime raw material for the cold rubber process to be employed at the $36,400,000 synthetic unit to be built in the Ruhr.

One-half of the capital is being found by Huels Chemical Works, while the firms of Bayer, Hoechst, and Badische are subscribing one-sixth each. The German tire industry will underwrite losses up to $11,200,000 for the initial term of 5 years.

This plant will account for some 30 per cent of West Germany's total consumption of rubber estimated for 1958 at 150,000 metric tons (332,000,000 lb.). The price per kilo, it is hoped, will not be higher than 4s.6d. (64 cents per kilo or 29 cents per pound) and so be competitive with the U. S. synthetic rubber sold c.i.f. Hamburg at 4s.5d. in early 1955.

### Italy

**Montecatini's Ferrara works . . .** This is the country's outstanding activity in chemical production from oil and natural gas. The major units in operation are those for polythene (8,000 metric tons or 17,840,000 lb. per year), polystyrene (8,000 metric tons per year), isopropyl, butyl, and isobutyl alcohol; acetone, dichloro-ethane, dibromoethane and ethylene chloride; plasticizers (phthalates) for PVC and Terylene.

The crude oil for this undertaking is obtained from the terminal of Porto Marghera (Venice) by waterway. The distillates are processed by cracking to yield highly pure ethylene, propylene, and butylene. Natural gas from the Po Valley forms the main raw material for the manufacture of ammonia which is converted into ammonium nitrate and urea.

**Making acetylene . . .** Also, acetylene from methane by partial oxidation has been manufactured on a commercial scale. The first plant to operate this process was set up by Monsanto Chemical Co., Texas City, Tex., in December 1952. This was followed by the SISAS


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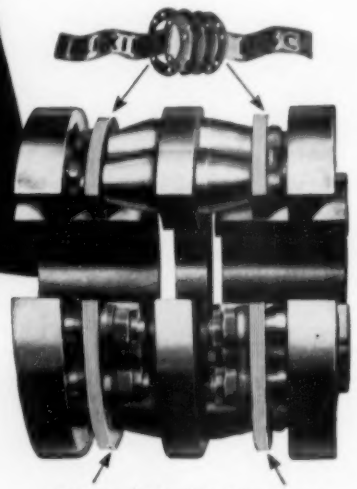

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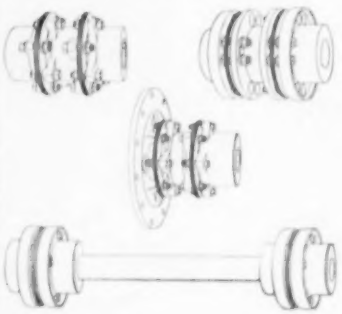

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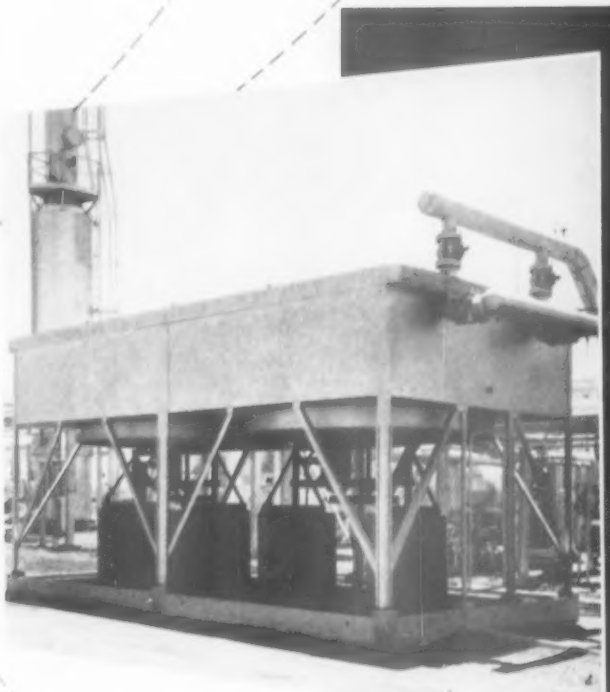

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plant near Milan, and that of ACSA Co. adjoining Venice.

These units have burners for a throughput of 2,000 normal cubic meters (71,500 std. cu. ft.) of methane per hour, corresponding to an output of 8 metric tons (17,840 lb.) of acetylene per day. For producing 1 kg. (2,205 lb.) of 100 per cent acetylene the following items are consumed: 4.3 kg. hydrocarbon, 4.9 kg. oxygen, 0.004 kg. solvent, 4.0 kg. low-pressure steam, and 1½-2 kw.-hr. electrical power.

**Synthetic rubber . . .** Work is in progress on a synthetic-rubber plant at Ravenna to produce 30,000 metric tons (166,150,000 lb.) of synthetic rubber, and 350,000 tons (775,000,000 lb.) of nitrogen fertilizer per annum, on completion in about 3 years' time. The rubber is to be produced from natural gas and the plant will be fed from a field adjoining the site. In early 1955 Italy was consuming around 10,000 tons (22,050,000 lb.) of synthetic rubber a year, but demand for this product is reckoned to go up markedly soon.

### Holland

The Royal Dutch-Shell Group manufactures an exceptionally wide range of petrochemical products at its Pernis installation, adjoining Rotterdam in Holland. The plant for the production of acetone and other organic solvents was completed toward the end of 1953, while the unit for the manufacture of synthetic resins (known as Epon in U.S.A., and Epikote elsewhere) was commissioned in mid-1953, with an annual output of 2,000 metric tons (4,410,000 lb.).

At the same time the production of Teepol (synthetic detergent) was stepped up. The installation for the output of the twin potent insecticides—Aldrin and Dieldrin—was commissioned some time ago.

**Epoxy resins . . .** The unit for epichlorohydrin production, one of the two basic ingredients of Epikote resins, is to be commissioned in September 1956, while the other item (di-phenylol propane) is already manufactured at the Stanlow petrochemical plant in Cheshire, England. For its preparation the Dutch plant is making use of the "hot chlorination" technique—the subject of a special study by Shell Development Co. in California. This process consists of the substitution of chlorine for one of the hydrogen atoms in propylene recovered from refinery gases. The resulting allyl chloride can be further processed to either glycerol or epichlorohydrin, the latter finding increasing application for chemical synthesis.

In the plastics field the Pernis petrochemical plant accounts for P.V.C. (polyvinyl chloride) made from a base material containing ethylene, separated from the refinery gases and reacted with chlorine to yield dichloro-ethane which is converted to vinyl chloride and polymerized into P.V.C.

**Synthetic fiber . . .** In February 1954, Algemene Kinstzijde Unie of Arnhem, Dutch manufacturers of rayon and nylon, concluded a licensing agreement with I.C.I. for the Netherlands and Belgian Terylene production rights. This "Terylene" ("Dacron" in U. S.) plant is now in operation.

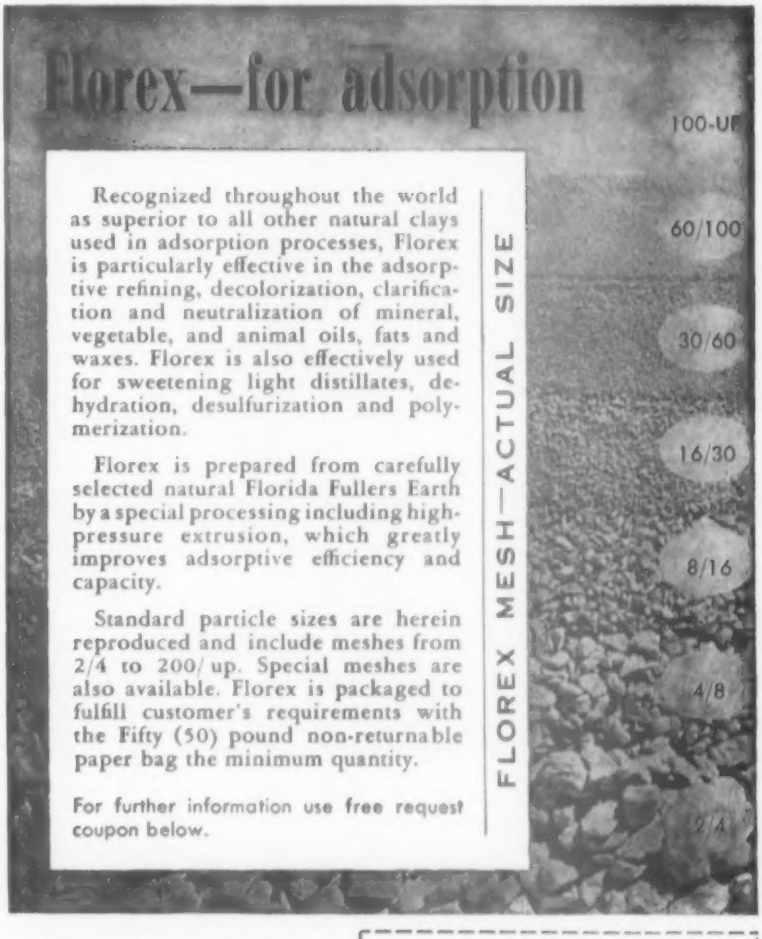
**Synthetic glycerin . . .** Work will shortly start on the construction of the first synthetic-glycerol plant in Europe—the only one outside the United States. It will be built at the Shell's Pernis refinery, and is expected to be commissioned toward the end of 1957.

### Belgium

According to Harry A. Rehnberg, president of Scientific Design Co., Inc., this company was awarded the contract for the design and engineering of ethylene oxide and glycol plants adjoining Antwerp. These are to be commissioned in 1956, and operated by the Societe Chimique des Derives du Petrole ("Petrochim").

### England

In the United Kingdom there are al-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ready well established five major petrochemicals units operated by British Celanese, B.P., I.C.I., Petrochemicals, and Shell Manufacturing Co. They have a combined throughput capacity of around 500,000 long tons a year of liquid petroleum feed stock, together with refinery gas and considerable quantities of slack wax.

**Grangemouth expansion . . .** British Petroleum Chemicals, Ltd., announced in early 1955 details of a $22,400,000 expansion plant at its Grangemouth Works. Contracts have already been placed and the new units are scheduled for commissioning at various times before the end of June 1957.

The current expansion at Grangemouth is in two parts: (1) duplicating existing units and (2) addition of new installations. The first part includes provision of a new cracking unit, and a second gas-separation plant, to augment the intake of light fractions from the refinery and the throughput of ethylene, propylene, and byproduct hydrocarbons. The production of ethyl alcohol is being stepped up by duplication of the existing plant. Sufficient ethylene will, however, be produced to meet the needs of the various Grangemouth plants and to have a surplus for outside sales.

**Butadiene . . .** A new plant, treating the $C_4$ stream drawn from the two gas-separation units will extract butadiene, and this installation is being engineered and built by Kellogg International Corp.

**Propylene tetramer . . .** Another addition comprises polymerization of the propylene stream to tetrapropylene in a new tetramer unit. Its output will more than satisfy the requirements of the third new plant—the detergent alkylate unit of Grange Chemicals, Ltd. (owned jointly by the B.P.C. and Oronite Chemicals, Ltd.). This plant converts indigenous benzenes and tetrapropylene provided by the B.P.C. and Grangemouth refinery into dodecylbenzenes.

Apart from the butadiene installation, the design and construction of the extensions is under the care of Stone & Webster Engineering Corp. and its U.K. affiliates—E. B. Badger & Sons. With a few specialized exceptions all the equipment for the new plant will be bought and fabricated locally.

**Union Carbide . . .** This company is erecting a new plant at Grangemouth for the production of polythene adjoining the B.P.C. works, which will provide the necessary ethylene under long-term contract to this company. This unit is to be commissioned in the fall of 1957.

**Shell . . .** At its Stanlow complex production of ethylene continued at full capacity, and the output of special olefins (for use in plasticizers) was stepped up in 1954. The design capacity of the first U.K. plant for manufacturing Epikote resins here in 2,000 long tons a year. This, together with its associated unit producing diphenol propane, involved an outlay of nearly $2,000,000.

**Imperial Chemical Industries . . .** The Wilton I.C.I. Terylene plant's current annual capacity of 11 million pounds is being doubled, while the company's polythene production topped 20,000 long tons in 1954. To meet the mounting demand for plasticizers this British chemical giant has built an installation for preparing higher alcohols. Based on the "oxo" carbonylation process, this process employs olefins originating from the cracking of slack wax. The resulting primary alcohols are designated "alphanols." The potential annual value of such products is placed at $14,000,000.

The Distillers Co. recently concluded an agreement with Dow Chemical Co. setting up a British concern (Distrene, Ltd.) for manufacturing polystyrene at its works at Barry in South Wales.

Finally, Monsanto, I.C.I., and Dunlop are building synthetic-rubber plants. In this race the U.K. Monsanto Chemicals is leading by a short neck.


NATURAL GAS
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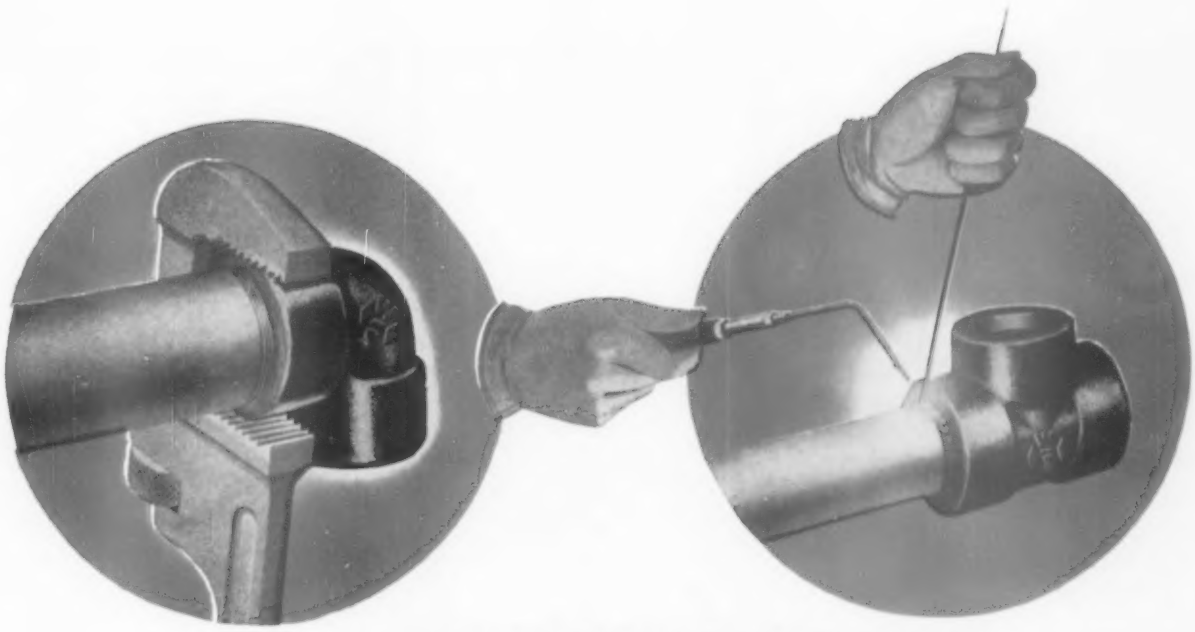

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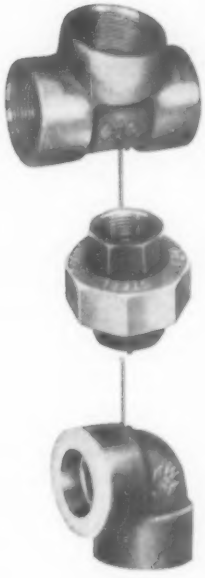

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**EAST AFRICA** A geophysical party of D'Arcy Exploration Co. at work in Zanzibar, East Africa. The first charge explodes.

**TRINIDAD** Offshore exploration for oil in Trinidad. Two of the erectors look back at platform on their way back to Point Fortin.

# British Petroleum Operations Are Far Flung

*Company rapidly forging ahead despite crippling setbacks*

BRITISH Petroleum Co. Ltd., (formerly Anglo-Persian, and subsequently Anglo-Iranian Oil Co.), with its subsidiary and associated concerns, is certainly one of the major units of the world oil industry. It produces, refines, ships, distributes, and markets oil and products.

The company's major sources of crude oil are still in the Middle East. Through its prospecting subsidiary (D'Arcy Exploration Co.) it is keenly interested in oil-bearing territories in many parts of the world, including Britain, where it has producing oil fields in the Midlands.

This premier British petroleum undertaking operates refineries in the United Kingdom, Aden, Australia, France, Belgium, Italy, Germany, and Israel. Distribution and marketing of petroleum products, are done both by the company itself and several associates. For marine transportation B.P.'s shipping subsidiary (British Tanker Co.) operates a fleet of ocean-going ships. Lastly, its major research establishments are at Sunbury, Middlesex, and Kirklington Hall, Nottinghamshire.

As the original name of the company signifies, its pioneer, as well as substantial interests, were centered in Persia. For this reason 1954 was notable for the settlement in October of the protracted Iranian oil dispute, and in December the company's name was changed from Anglo-Iranian Oil Co., Ltd. to British Petroleum Company, Ltd.

In settling this 3-year-old dispute between the A. I. O. C. and the Persian Government, two persons played an outstandingly important role. They were Howard Page, of Standard Oil Co. (N. J.) and H. E. Snow, a managing director of A. I. O C. The latter retired from the board of the company on appointment as the first general manager of Iranian Oil Participants, Ltd., the newly formed firm through which the consortium companies hold their interests in the concerns operating in Iran under the agreement of October 29, 1954.

Each of the parties concerned willingly entered into the negotiations leading up to the Persia-Consortium Agreement, and such negotiations were amicably carried out with the object of assuring to the Government of Iran and National Iranian Oil Co. (N. I. O. C.) on the one hand, a substantial export market for Iranian oil and a means of increasing the material benefits to and prosperity of the Iranian people, and to the companies, on the other, the degree of security and the prospect of reasonable rewards necessary to justify the commitment of their resources and facilities for the reactivation of the Iranian oil industry.

Under the agreement the eight consortium companies have combined to produce and refine oil on behalf of N. I. O. C., but market it separately through their own appropriate channels. In this setup of the operating (and servicing) companies, British Petroleum holds 40 per cent, Shell 14 per cent, and the six other members 46 per cent. Turning to the trading sector, N. I. O. C. holds 12½ per cent and the remainder of 87½ per cent is apportioned among the members of the consortium in the same proportion as on the operational side.

Since then the various operations and arrangements provided for in the agreement have been proceeding smoothly

**ADEN** The two crude distillation units and power house of the British Petroleum Company's new Aden refinery.

as planned, reflecting credit on all those participating in the inevitably difficult initial stages of so large and complex an undertaking.

Thus during the first 8 months of 1955, Iranian Oil Exploration & Producing Co. produced 9,771,000 long tons of crude oil and the daily average output for August was 154,000 bbl. In the same period Iranian Oil Refining Co. at Abadan accounted for a throughput of 4,981,000 long tons, while the daily figure last August was 155,000 bbl.

**Exploration . . .** B. P.'s exploration operations have been stepped up both in the United Kingdom and in the various overseas territories in which it has interests. In Canada, the company has increased its interest in Triad Oil Co. to 50 per cent, bringing its investment in this concern to nearly 20 million dollars. Triad holds interests in oil reservations and leases in western Canada, which, during the financial year ended in November 1954, were increased from 430,000 to 2,127,000 acres; and it has since acquired further interests in British Columbia and Alberta. Also, production tests are being carried out, by the B. P.'s associate Trinidad Northern Areas, Ltd., in a deep test well in the Gulf of Persia.

The company's search for oil in Britain is being extended. Also, the 5-year program of exploration for natural gas in the United Kingdom, which its prospecting affiliate has undertaken for the Gas Council, is proceeding according to plan. Test wells have been drilled in Scotland and Sussex (England), and geological and geophysical surveys are being carried out in various promising prospects.

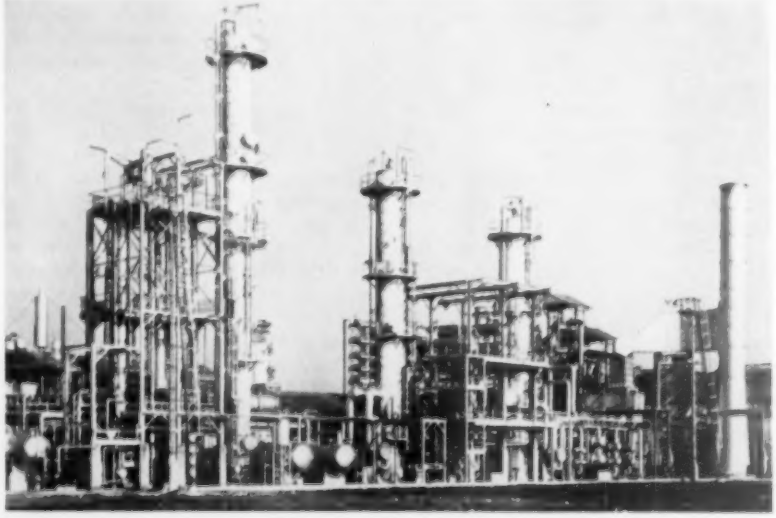
In East and West Africa, where B. P. is associated with the Royal Dutch-Shell Group, exploration has actively continued. Several geological and geophysical parties have operated over large areas of Tanganyika, Kenya, and Zanzibar; and the first deep well was begun last December on Mafia Island. In Nigeria, four seismic parties were at work, where several test wells were drilled, and there were further encouraging oil and gas shows.

In Papua in the Pacific, test drilling was continued at Omati, under conditions of extreme difficulty, which delayed a final appraisal of the high-pressure gas. Geological and geophysical parties were operating throughout last year and this in trying jungle territory. In Australia, plans for B. P.'s associate company to start test drilling in the Gippsland district of Victoria are well advanced.

A marine geological survey off the Trucial Coast in the Persian Gulf was carried out in the spring of 1954; and a marine seismic survey launched last December has now been completed.

In Sicily, the company's test well at Vittoria proved the presence of oil, but of heavy asphaltic quality of doubtful commercial value. B. P. has acquired an exploration license over Malta. A preliminary geological survey has been completed, and a more intensive one is under way.

**Production . . .** Turning to production, the company's offtake in 1954 was 26,457,000 long tons from Kuwait, 8,317,000 long tons from Iraq, and 1,124,000 tons from Qatar—a total approaching 36,000,000 tons (an increase of 4,000,000 tons over the previous year).



**BRITAIN** The Platforming unit at British Petroleum Co.'s Kent refinery on the Isle of Grain. This is the fifth of seven Platformers to be built for the B. P. group.

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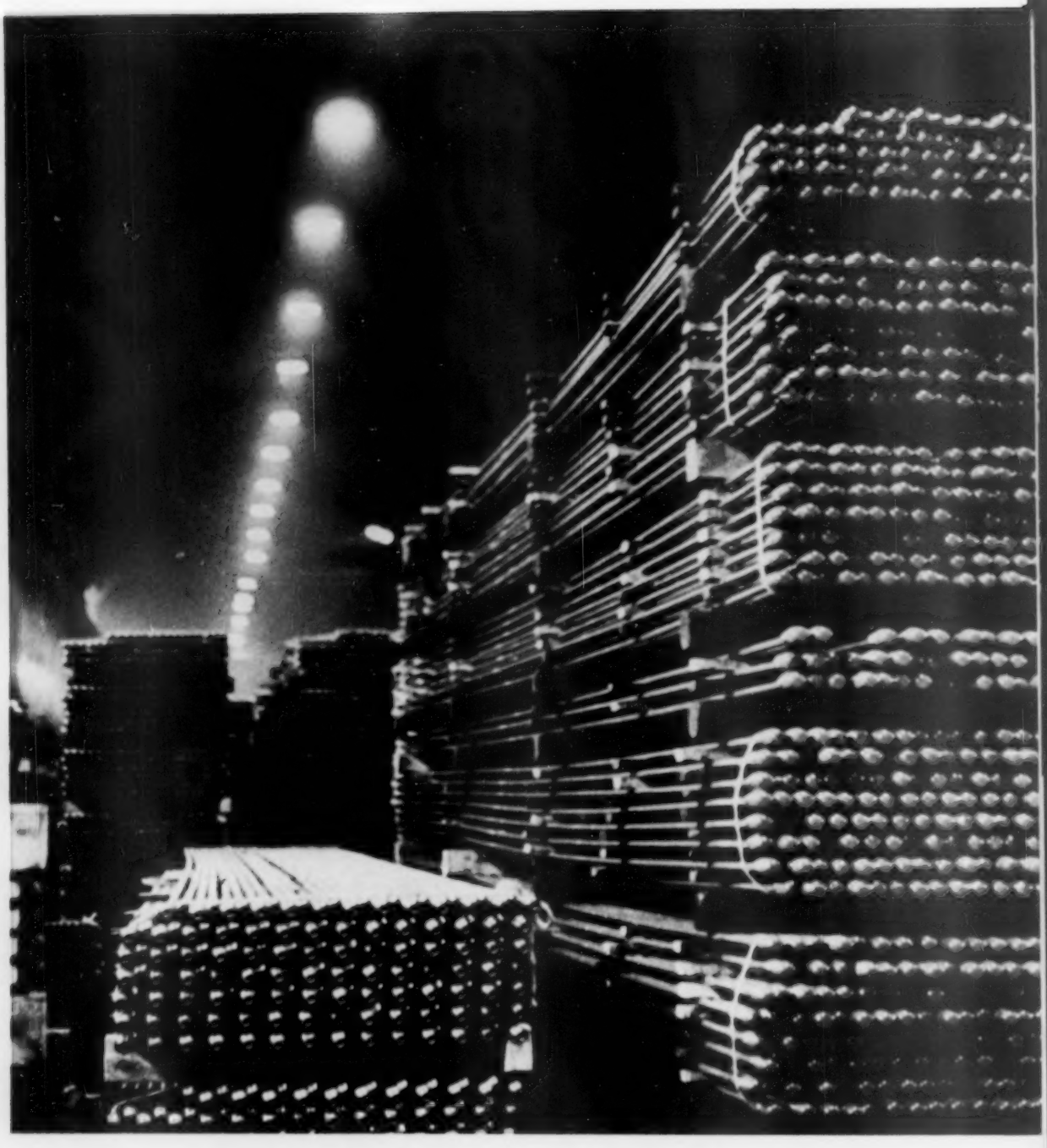

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*In a new bulletin covering National Sucker Rods*, you can get complete information on the grades shown here, along with the important facts about National's hollow and plastic-coated rods. Ask the National representative in your area for a copy soon.

## GRADE 40

| Yield Strength (PSI) | Tensile Strength (PSI) | Load Range | Condition |
|---|---|---|---|
| 60,000-70,000 | 90,000-100,000 | Moderate to heavy | Little or no corrosion |

## GRADE 62

| Yield Strength (PSI) | Tensile Strength (PSI) | Load Range | Condition |
|---|---|---|---|
| 60,000 minimum | 90,000 minimum | Moderate to heavy | Medium corrosion, medium sulphide |

## GRADE 81

| Yield Strength (PSI) | Tensile Strength (PSI) | Load Range | Condition |
|---|---|---|---|
| 65,000-75,000 | 85,000-95,000 | Moderate to heavy | Bad corrosion but little sulphide |

## GRADE 92

| Yield Strength (PSI) | Tensile Strength (PSI) | Load Range | Condition |
|---|---|---|---|
| 90,000 minimum | 115,000 minimum | Heaviest | Severe sulphide corrosion |

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see next page for more quality production equipment

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are manufactured in 38 standard combinations, API rated beam loads from 3,200 to 32,400 lbs.—there's a model to economically suit every pumping job.

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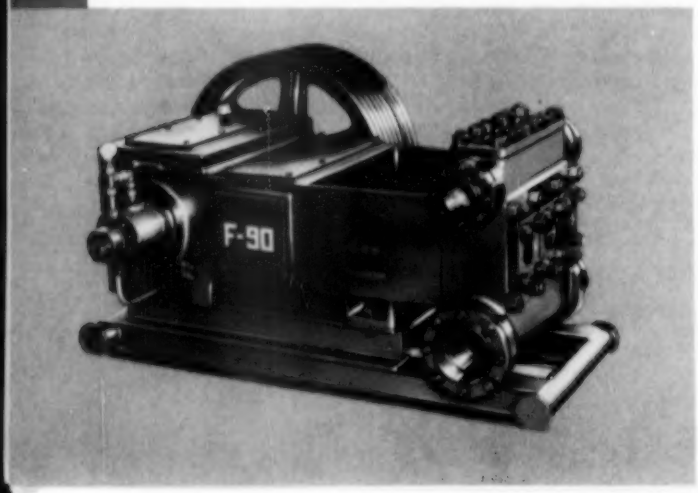
provide maximum volume and injection pressures for today's waterflood projects. Available in several hp ratings for both corrosive and non-corrosive service, these pumps are especially suited as power-oil sources for subsurface hydraulic pumping, oil gathering and salt water disposal services.



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has interchangeable units which provide a multitude of combinations to meet your specific needs in size, capacity and type. Ease of assembly and pre-tested safety are two major features of this equipment.

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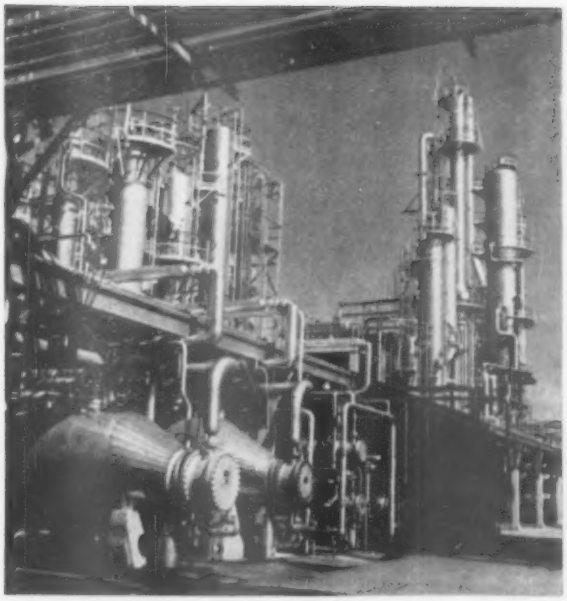
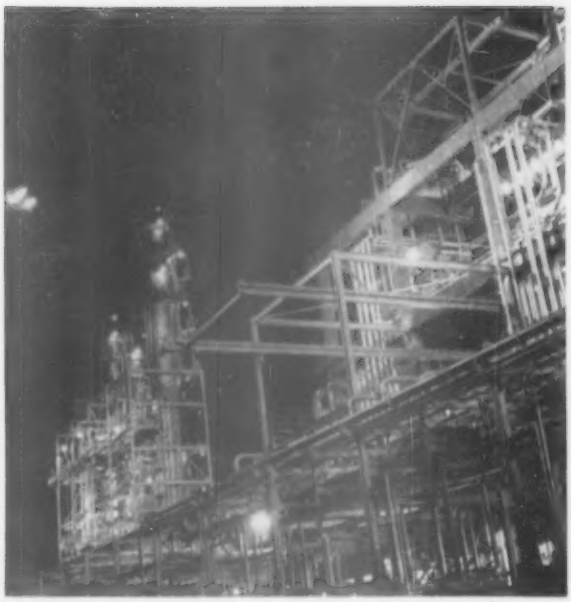
NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT



**BELGIUM** Catalytic cracking unit at the Antwerp refinery, jointly owned by British Petroleum Co. and Belgium Petrofina.



**FRANCE** General view of lubricating-oil plant at the Dunkirk refinery. Furfural unit is in background; M.E.K. unit is in foreground.

As from October 29, 1954, when the agreement between Iran and the consortium companies became effective, to the end of the year, B. P.'s liftings from Persia amounted to 440,000 tons, nearly one-third as crude and the remainder in refined products. Current offtake from Iran is at an annual rate of 5,000,000 tons, including 2,000,000 tons of crude.

In Britain the company's crude-oil output in 1954 was 59,000 tons (54,600 tons in 1953). There are now three producing wells at the new Plungar oil field in Leicestershire. Early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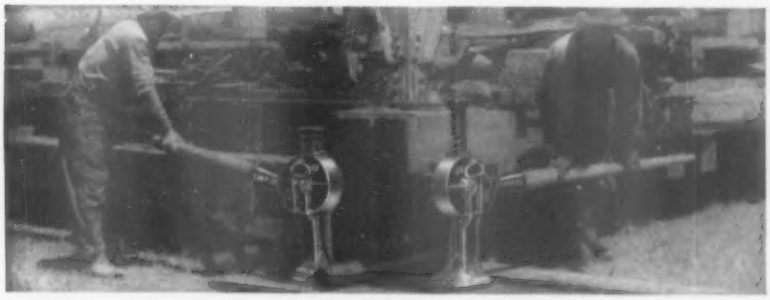
## with Simplex Jacks



**SOMETIMES IT TAKES TWO** . . . With right and left hand toes, respectively, Simplex Nos. 126 and 127 ratchet lowering geared jacks can be used as a pair for lifting and lowering rigs or other heavy equipment. 25-ton capacity on cap or toe. Powerful geared mechanism makes jack faster and easier to use than standard speed types.

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**LIFTS IN A HURRY** . . . For extra speed and ease of handling on many heavy duty oil field lifting jobs. Simplex Model 2029 lifts 20-tons on cap *or* toe. Single acting, ratchet lowering lever type.

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this year oil was discovered at Egmanton, 6 miles northeast of Eakring fields. The discovery was made in the first well drilled following a seismic survey. There was a show of good quality oil at a depth of about 3,200 ft. in formations of the same age as those producing petroleum at Eakring.

In Scotland the production of shale oil amounted last year to 99,700 tons, or about 4,300 tons less than during 1953. Due to rising costs of coal and stores, coupled with a decrease in product values, the reduction in October 1953, of 6d. per gallon in excise duty has proved inadequate to wipe out operating losses.

In Trinidad, B. P.'s associate—Trinidad Northern Areas, Ltd.,—is developing production from a marine area by drilling deviated wells from the foreshore; 20,000 long tons of crude were produced from these wells last year.

**Refining** . . . B. P.'s total refinery throughput, at 24,000,000 long tons, was 4,000,000 tons more than during the preceding year. Major contributors to this end were the new Aden refinery, commissioned in July last year; and the Kent and Hamburg installations. On February 1 the Kwinana refinery in Western Australia went on stream. This, coupled with the development of the company's other refining units and interests, is reckoned to lift B. P.'s aggregate capacity to nearly 30,000,000 tons by the end of 1955. Side by side with this expansion in refining capacity, installation of new plants is under way at several refineries in an increasing effort to achieve the highest quality of products in the most efficient way.

In Britain, the company's four refineries had a combined throughput in 1954 of 10,563,000 tons, mainly accounted for by Kent (4,064,000 tons), Llandarcy (3,715,000 tons) and Grangemouth (2,624,000 tons). At the Kent refinery a lube-oil plant was commissioned in mid-1954, and it produced 37,000 tons of lubricants by the end of last year. A Platformer for the production of high-grade gasoline was put into operation in early 1955, and a similar unit was brought on stream at Llandarcy later. At Grangemouth a catalytic polymerization plant was commissioned, as also a sulfur unit now yielding 3,000 tons per annum. At Pumpherston refinery, processing Scottish shale oil, and crude produced from domestic oil fields, the throughput in 1954 was 159,000 tons.

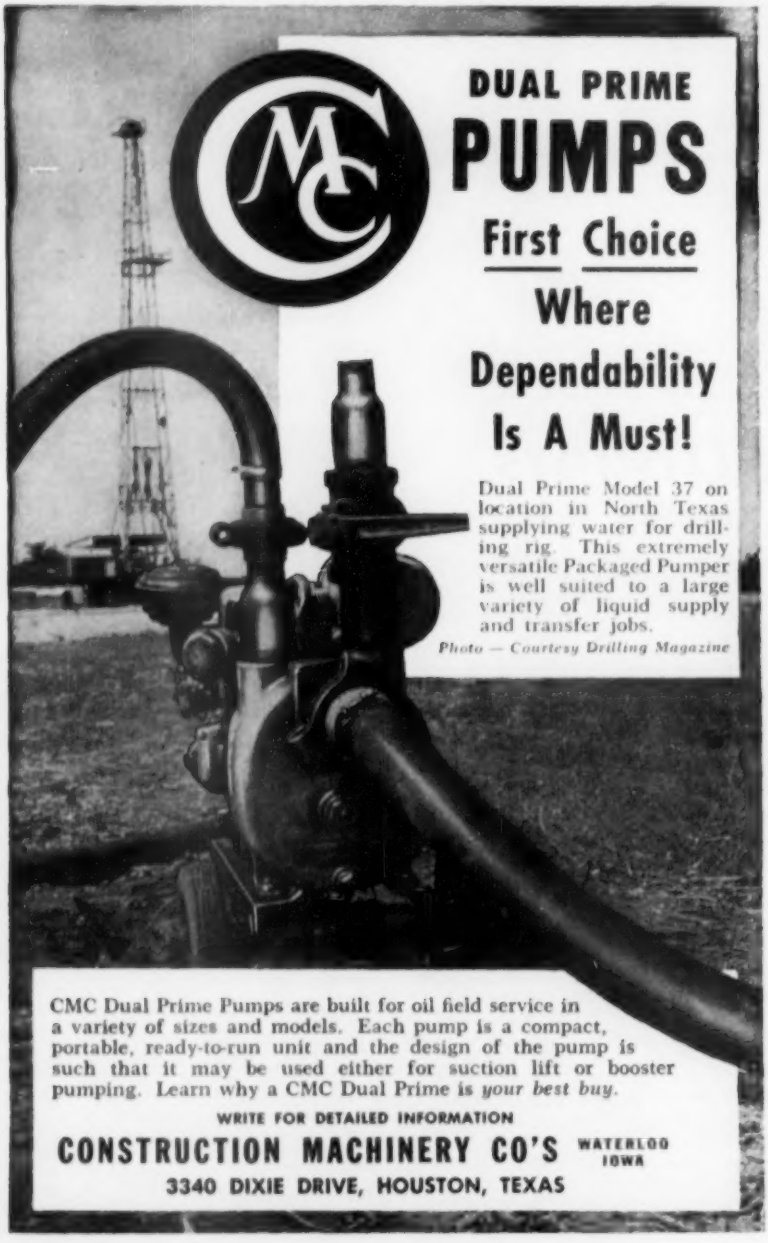
The throughput of the Antwerp plant, owned jointly by B. P. and Petrofina, was 1,779,000 tons. A catalytic polymerization unit was commissioned last December, and a cat cracker completed in early 1955. The existing thermal cracking plant has been revamped to increase crude distillation capacity to 2,700,000 tons a year.

In France, throughput of the installations of Societe Francaise des Petroles B. P., totaled 3,920,000 tons last year. At Lavera a Platformer went on stream, while at Dunkirk improvements to the lube-oil unit increased production of lubricating oil and wax to 72,000 tons (54,000 tons in 1953).

In Germany, the Hamburg refinery throughput was 1,180,000 tons (705,000 tons in 1953), following the commissioning of a new crude-distillation unit in March 1954. A bitumen plant and a Platformer were also brought on stream last year. At the Oelwerke Julius Schindler refinery a new installation for treating lube oil was commissioned in October 1954.

In Italy, at the Marghera (Venice) refinery, which B. P. owns jointly with A. G. I. P., the throughput rose from 1,381,000 in 1953 to 1,519,000 tons last year. A Platformer unit, now under construction, is to be commissioned in 1956.

In the Middle East the Haifa refinery in Israel, with which B. P. is associated, had a throughput of 930,000 tons in 1954; while that of the Kuwait refinery was 1,425,000 tons. At Abadan refinery which started operation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Dual Prime Model 37 on location in North Texas supplying water for drilling rig. This extremely versatile Packaged Pumper is well suited to a large variety of liquid supply and transfer jobs.
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in accordance with the agreement between Iran and the consortium companies towards the end of October last year, the 1954 throughput was 898,000 tons and B. P.'s offtake was 280,000 tons. This refinery's throughput was running at an annual rate of 7,500,000 tons in mid-1955. At the Aden refinery, commissioned in July 1954, the throughput was 1,234,000 tons by the end of the year, and in mid-1955 exceeded 4,000,000 tons per annum. The Aden Platformer brought on stream in October 1954, was the first of the company's seven Platformers to be commissioned.

In Australia, at the Laverton (Melbourne) plant in 1954 throughput was 164,000 tons. Such gratifying progress was made last year with the construction of the new 3,000,000-ton-capacity Kwinana refinery that it came into operation on February 1, 1955, some 10 weeks ahead of schedule.

### Research

Intensive investigation of the sulfur compounds present in Middle East crudes, and the means for their removal, was carried out throughout last year, and is still in progress. As one result B.P. now has three Autofining units, and one hydrodesulfurization installation in operation at its refineries, and has plans to install a large unit for the removal of sulfur from automotive diesel fuels.

The company's production research center at Kirklington Hall has continued the development of new seismic techniques and more efficient use of explosives in seismic surveys with the goal of reducing the cost of exploration operations. Also under study is the application of geochemical and radioactive methods in prospecting for petroleum, both near the surface and at depth, for which suitable instruments are being developed by B.P. technicians.

Particular attention has been paid to studying the mechanism of oil recovery from fissured limestone reservoirs, following which the calculation of production processes for optimum petroleum recovery has markedly improved.

H. E. Snow, general manager of Iranian Oil Participants, Ltd.

Lord Strathalmond, B. P.'s chairman and managing director.


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# Five Companies Seeking Oil in Yugoslavia

## Production has jumped from 8,000 bbl. per year in 1939 to more than 1½ million in 1955

**by Vladimir Aksin**

AN outstanding example of the comeback and rise of European industry since the end of World War II is the growth and expansion of the Yugoslavian oil industry. From an insignificant rate of 8,000 bbl. of oil per year in 1939, the oil output of this country has risen to over 1½ million barrels yearly. And there are good prospects of even higher production.

Credit for this development is due to the active use of geological prospecting and exploratory drilling. At present, there are five companies engaged in these activities and also in the production of oil. Each of these companies is independent and is freely acting within its terrtory. They are:

1. "Naftaplin," Zagreb, Croatia.
2. "Naftagas," Novi Sad, Serbia.
3. "Nafta," Lendava, Slovenia.
4. Enterprise for exploration of oil and gas, Simin Han, Bosnia.
5. Enterprise for exploration of oil and gas, Bar, Montenegro.

All of these companies are members of the Association for the Production and Refining of Oil and Gas in F.N.R.J. This is an organization created for better coordination of oil-industry activities and interchange of information.

Author is chief of the Geological Department of Naftagas, Novi Sad, Serbia.

**Early development . . .** Before World War II, only small amounts of oil had been found in Yugoslavia. Exploration has uncovered oil in Bosnia near the town of Tuzla and in Medjumurje County (small oil fields Selnica and Peklenica). Some success was also had at Gojlo in Croatia. Most of the 8,000 bbl. of yearly production came from Bosnia.

During the occupation of Yugoslavia, the Germans began to explore the oil potential of large parts of the country. This work included regional gravimetric surveys of nearly the whole Pannonia basin within the borders of Yugoslavia. The rate of exploratory and development drilling was also increased. For all their efforts, however, the Germans discovered only one new oil field during their occupation. This was Petesovci, discovered in 1943. At the end of the war, Yugoslavia's oil assets were only two oil fields (Gojlo and Petesovci) and one gas field (Janja Lipa).

**Postwar progress . . .** Following the

**TABLE 1—OIL AND GAS PRODUCTION IN YUGOSLAVIA**

| Year | Oil, bbl. | Gas, M.M.c.f. |
|---|---|---|
| 1939 | 8,050 | 92.7 |
| 1940-1945 | (No data available) | |
| 1946 | 207,000 | 300 |
| 1947 | 239,000 | 410 |
| 1948 | 262,000 | 292 |
| 1949 | 455,000 | 294 |
| 1950 | 792,000 | 510 |
| 1951 | 1,064,000 | 477 |
| 1952 | 1,087,000 | 488 |
| 1953 | 1,233,000 | 2,580 |
| 1954 | 1,556,000 | 3,180 |
| To Sept. 1955 | 1,226,000 | |

**TABLE 2—INCREASE OF YUGOSLAV DRILLING**

| Year | Footage drilled |
|---|---|
| 1931 | 4,310 |
| 1941 | 21,400 |
| 1945 | 10,300 |
| 1950 | 276,000 |
| 1954 | 275,000 |

**TABLE 3—RESULTS OF RECENT DRILLING IN YUGOSLAVIA**

| Year— | Footage drilled | Wells— Drilled | Oil | Gas | Under test | Dry |
|---|---|---|---|---|---|---|
| 1954 | 275,000 | 69 | 32 | 4 | 10 | 23 |
| To July 1955 | 115,000 | 28 | 14 | | 7 | 7 |

**TABLE 4—MAXIMUM-DEPTH RECORDS OF WELLS DRILLED IN YUGOSLAVIA**

| Company and well— | Year | Depth (ft.) |
|---|---|---|
| Petrolej D. D.: | | |
| 4 Gojlovo | 1942 | 7,100 |
| "Nafta," Lendava: | | |
| 5 Petesovci | 1947 | 8,230 |
| "Naftaplin," Zagreb: | | |
| 21 Mramor Brdo | 1953 | 8,350 |
| 1 Medjumurje | 1954 | 9,480 |

**TABLE 5—REFINERY THROUGHPUT IN YUGOSLAVIA**

| Year | Bbl. of oil |
|---|---|
| 1939 | 700,000 |
| 1946 | 153,000 |
| 1947 | 284,000 |
| 1948 | 960,000 |
| 1949 | 2,410,000 |
| 1950 | 3,410,000 |
| 1951 | 3,620,000 |
| 1952 | 3,720,000 |
| 1953 | 4,200,000 |
| 1954 | 4,770,000 |

**PRESENT OIL AND GAS fields and areas of current exploratory drilling.**

liberation of Yugoslavia, Yugoslavs increased the efforts to discover oil and gas. As may be seen in Table 1 these efforts have been rewarded. Following the first few years of relatively static production, oil production has steadily increased. There is a good prospect that this will continue.

A number of geologically favorable areas are being explored which could greatly increase the production potential. The accompanying map of Yugoslavia shows the present oil and gas fields and the areas of current exploratory drilling. The most favorable territory is the Pannonia basin in the north part of Yugoslavia. Only 5 to 7 per cent of this area has been explored.

Of the 10 oil fields shown on the map, only 6 are in production: Klostar, Sumecani, Bunjani, Mramor Brdo, Gojlo, and Petesovci. The other four are in preparation for being put in production. The two gas fields—Velika Greda and Janja Lipa—are in partial production. After pipelines are built, regular production will commence. The total known industrial reserves of Yugoslavia are estimated to be about 36,000,000 bbl.

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**Geology** . . . From the geological standpoint, all the oil fields in Yugoslavia are of Tertiary age and belong to Miocene and to Pliocene epochs. The reservoir rocks are sands and sandstones.

All existing oil and gas fields are in the Pannonia basin, in the north part of Yugoslavia. In the other parts of Yugoslavia, wide geological prospecting is being done. This includes gravimetric and seismograph surveys as well as exploratory drilling. The wildcat wells being drilled are shown on the map.

**Drilling** . . . Back of the increasing oil production of Yugoslavia is a dynamic and active drilling industry. Since the liberation of Yugoslavia, drilling has increased tremendously. Table 2 shows extent of this increase.

Table 3 gives a breakdown of the drilling for the past 2 years. Footage and number of wells drilled in the first part of 1955 are lagging behind the 1954 rate of drilling because the main drilling activity takes place from June to September. Drilling in most areas does not begin until March or April because of bad weather and muddy terrain. On the basis of 1954 drilling activity for the same part of the year, the drilled footage so far in 1955 indicates that 1955 total footage should exceed the total for 1954.

The average depth of wells in Croatia is 3,840 ft., in Slovenia about 5,570 ft., and in Serbia about 3,600 ft. However, some deeper wells are being drilled as exploration work is increased. The deepest well which has been drilled in Yugoslavia is 9,480 ft. deep, and was drilled in 1954. Table 4 shows previous record depths since 1942.

**Pipelines** . . . At the present, there is only one pipeline in Yugoslavia. It is 30 km. long and connects Velika Greda gas field to the town of Vrsac. Another pipeline is presently being built. It will be 86 km. long and will connect Janja Lipa gas field to Zagreb. Also planned is a pipeline between Velika Greda and Beograd, 70 km. long.

**Refineries** . . . There are three refineries in Yugoslavia, located in Rijeka, in Sisak, and in Bosanski Brod. They are refining both domestic and imported crude.

Table 5 shows how refinery throughput has ranged in the past years. Comparing the crude oil refined to that produced (Table 1), it may be seen that there have been only about 2 years, 1946 and 1947, when the domestic crude produced was sufficient for the refinery runs.

Total capacity of all three refineries is about 7,000,000 bbl. per year. This is considered sufficiently high for present domestic needs.

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Two singles, six drill collars and a 9" bit were stuck in open hole at 6400'. Operator ran in open ended with safety joint, 4¾" McCullough Double Acting Rotary Jar and six drill collars. Screwed into fish and jarred down for 24 hours then up for 11 hours and the fish came free. A total of 35 hours jarring time. Fishing string weighed 124,000 lbs. and Jars were striking at 190,000 lbs.

Operator was pulling out when pipe again stuck in a key seat at 2800'. After three hours of jarring down, the string was freed and gradually worked through the key seat.

Further up the hole the fish again stuck, tighter than before. It took eight hours of down jarring to free the pipe, after which all pipe was pulled from the hole.

After being subjected to 46 hours of heavy jarring, the McCullough Rotary Jar was still in perfect condition when removed from the hole.

The ability of McCullough Jars to strike blows both up and down saved the operator a great deal of money and lost time in this double emergency.

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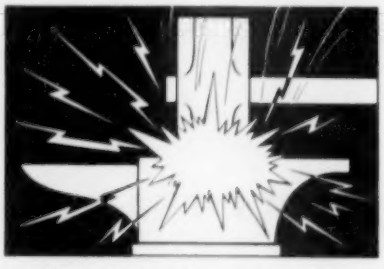
## *New Strength and Extra Service Life Added to McCullough Double Acting Rotary Jars*

Always the standard of reliability for tough jarring operations, the McCullough Double Acting Rotary Jars have been further improved by adding 97% more solid steel to the effective area of their jarring surfaces.

This additional area of solid steel has been added to both the up-blow and down-blow striking surfaces, providing greater strength and longer life for any jarring requirement.



Double size jarring surfaces make McCullough Jars tougher—last longer—do more work.

## *McCullough Jars Stay Packed on Toughest Jobs*

McCullough Rotary Jars have extra long packing—approximately 8" in length. This packing is carried on the top end of the jar mandrel and is pretested to 6000 p.s.i. It seals tightly in the smooth, precision finished inside surface of the jar body.

This construction eliminates the use of a trouble-giving wash pipe and provides an extra large circulation hole which makes the jars ideal for use with all types of tools.

The ability to stay packed is one of the many reasons why improved McCullough Rotary Jars are the most practical for every jarring operation. They are first choice with operators on the world's deepest wells for coring operations, on formation tests, in treacherous digging, reaming, milling and washover operations. They are dependable.

### STRIKES 70 TON BLOWS FOR 72 HOURS

An example of what a tremendous beating the improved McCullough Rotary Jars will withstand, is illustrated by a recent job in a California gas well.

Operator was drilling at 5400' when drill pipe stuck. Backed off free pipe, leaving drill collars and 12¼" bit in the hole. Ran in with 8" O.D. drill collars above 6¾" improved McCullough Rotary Jars and screwed into top of fish. Jarred steadily for 72 hours striking 70 ton blows above the weight of the drill string. At the end of this time the McCullough Jars were still in good condition.

These improved Rotary Jars have been used on a great many jobs as this—some a great deal tougher. But, whatever the job, the operator can be sure of one thing—complete dependability. And this dependability, earned in more than 20 years of service, is now greater than ever because new strength and extra service life have been added.

## *McCullough Jars First Choice for Drilling Operations*

McCullough Rotary Jars have been consistently chosen for continuous use in the drill strings of the world's deepest wells. Reasons are: Their simplicity and ruggedness—their ability to resist wear and shock—their ability to stay packed under severe usage—their positive, controlled action—the fact that change of temperature does not effect jarring action—and their complete reliability in an emergency.

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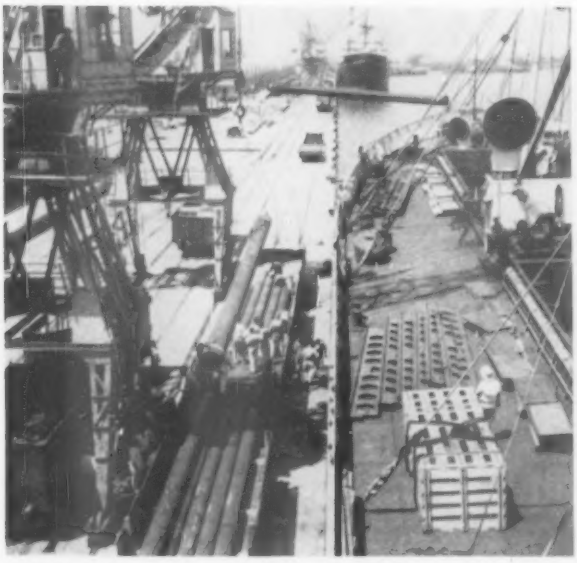


UNLOADING 16-in. pipe at the Karachi, Pakistan, docks for the Sui-Karachi gas line.

LINING UP the last joint for welding on April 18, 1955.

OPERATIONS for boring through casing for laying pipe at a railroad crossing.

CLEARING a rock ditch with hand labor.

# Asia's Largest Natural-Gas Line Completed

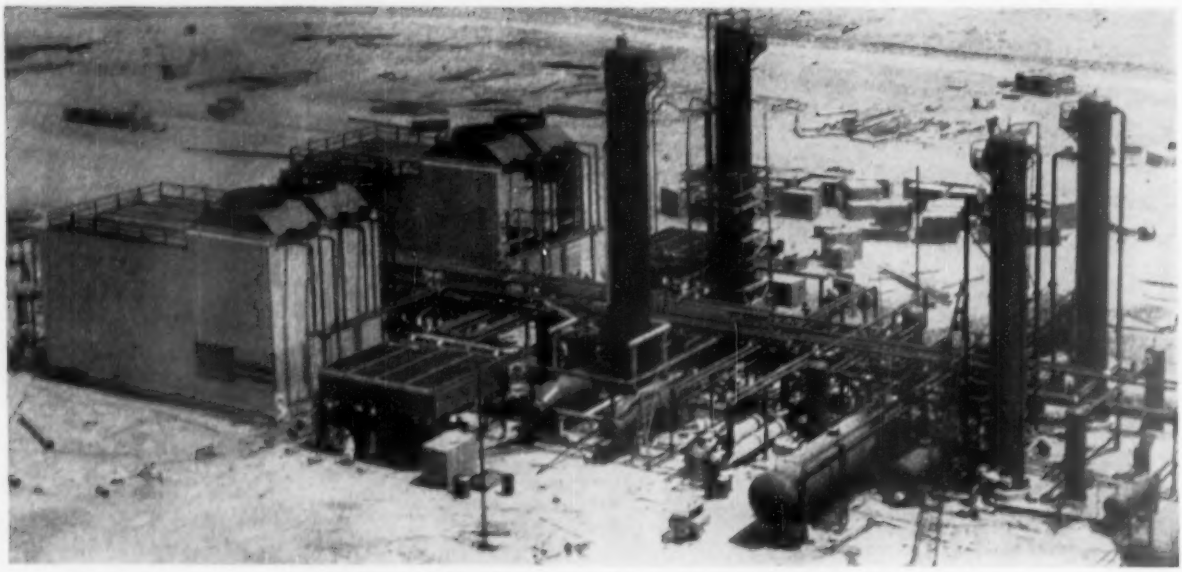
## Construction rate averaged mile a day per spread. Completion was year ahead of schedule

ASIA'S largest natural-gas pipeline has been completed this year ahead of schedule. The project is a 348-mile, 16-in. transmission line built by Sui Gas Transmission Co. at a cost of $28,000,000. It extends from Sui field in Baluchistan to Karachi, Pakistan.

Initial operation aims at delivering 37,000,000 cu. ft. daily to power-plant and industrial consumers—mainly cement and textile manufacturers. Power plants and industries at Karachi, Hyderabad, Rhori, and Sind are switching from coal and fuel oil to natural gas. Later it is expected that throughput may be tripled by two compressor stations which would give a transmission capacity of 110,000,000 cu. ft. a day. Through this utilization of available natural-gas resources, it is estimated that the project will save the Pakistan Government close to Rs 25,000,000 during the initial phase of operation.

Another 193-mile pipeline has been planned to transmit Sui gas to Multan in South Punjab as a future outlet.

The whole line from Sui to Karachi



**GAS PURIFICATION plant for the pipeline in Sui field in Baluchistan.**

was built with a good average rate of progress of more than 1 mile a day per spread. This was accomplished in spite of difficult climatic and terrain conditions. The entire line was hydraulically tested. Unusual practices were applied at the "barrage crossings" where artificial bars have been placed in waterways to divert the current.

The project was developed after a report was prepared by C. Stribling Snodgrass, an American consultant, for Pakistan Petroleum Co., which is owned 70 per cent by Burmah Oil Co., and 30 per cent by the Pakistan Government. Sui Gas Transmission Co., affiliated with Burmah Oil Co. and Pakistan Industrial Development Corp., buys gas from Pakistan Petroleum, Ltd. For the project, the World Bank loaned £5,000,000 ($14,000,000). Under a 20-year pact, Burmah Oil Co. (Pakistan Trading), Ltd., will act as managing agents for Sui Gas Transmission Co., Ltd. Pipe and other materials for the project were bought direct in Britain by Burmah Oil Co. (Pakistan Trading) acting for Sui Gas Transmission Co.

The six wells now drilled at Sui field indicate that the reservoir is wider and longer than estimated in the initial stages of planning for pipeline project.

**Terrain** . . . The Sui-Karachi line traverses dry, and in part, desert terrain for nearly 180 miles altogether. At the upstream end the line descends 750 ft. to 20 miles of desert where the line runs out of Sui. At the downstream end there are 96 miles of desert where it extends into Karachi. The rest of the desert lies in patches with irrigated patches along the remainder of the 170 miles of the pipeline route. Rocky ground for about one-fifth of the length of the line required a large amount of blasting. The line crosses the Indus River at two places.

Below the upstream crossing of the Indus River, the line skirted the Khairput Desert and traversed the rich cotton and wheat areas of the Hawabshah and Hyderabad districts of Sind. Between the downstream crossing of the Indus at Kotri and Karachi, the terrain is rocky desert.

Temperatures during construction ranged from 82° to 108° F.

The actual construction of this 348-mile, 16-in. line only took 168 days—3 weeks less than the contract schedule.

**Pipe-laying progress** . . . The over-all rate of laying was 2.08 miles per day. Sometimes 3 miles were welded and backfilled on single days.

The first shipment of pipe arrived in August 1954 and the last in March 1955. Welding began in September 1954 and the last weld was made on April 18, 1955.

Laying of the line was contracted by Sui Gas Transmission Co. to D and C and William Press, Ltd., who entered into a joint venture with Morrison-Knudson Corp. These firms formed Pakistan Constructors Co. for building the line.

Two spreads laid the line working north and south starting at a point 135 miles from Sui gas field. The spreads were supervised by D. J. Batten and R. F. Batley. Their operations were coordinated by J. W. Jones.

Communication between the spreads was by radio to Karachi. Each spread had a radio station. Rapid travel along the pipeline was accomplished by two Dove airplanes. A helicopter was used on some of the survey.

**Personnel** . . . At the peak of construction, the project employed 120 Britons and Americans and 1,080 Pakistanis. In addition to these, at one stage when barrage work and rock blasting were being done, there were nearly 2,000 subcontractor's men on the job.

Camps for each spread were built providing air-conditioned cabins made of aluminum insulated with glass wool. Each camp had its own power plant.

Pipe is 16-in. o.d. seamless A.P.I. 5LXX46. It came in three wall thicknesses—0.438-in., 0.312-in., and 0.250-in. Pipe was all supplied to the project by Stewart & Lloyds in the amount of 43,836 long tons.

Ditch was dug for 3½-ft. cover except at valve installations and river and canal crossings.

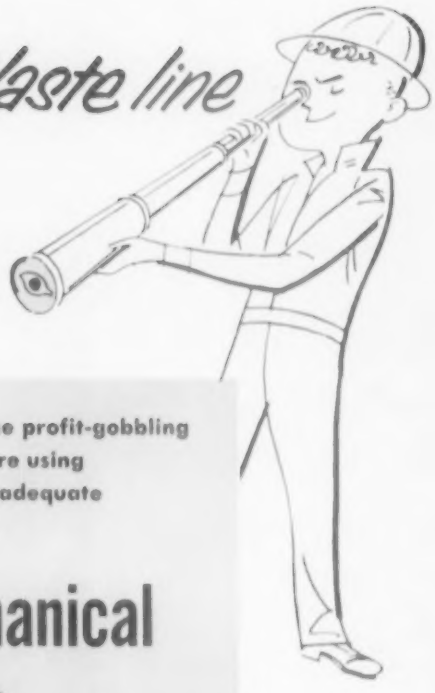
Welding was done with three beads or more made with Fleetweld 5 and Shieldarc 85.

**Coating and wrapping** . . . Pipe was protected by coal-tar enamel with an inner wrap of glass mat. At some locations there was also an outer wrap of tar-impregnated glass or kraft paper. Such protection was furnished along the line except at barrage and water crossings where a tape wrapping was used with a finishing coat of aluminum paint. The line is also cathodically protected.

**Valves** . . . There are 30 main 12-in. valves, including automatic shutoff valves at each of the barrage crossings and 140 smaller valve of 1.5, 4, 6, and 8.5-in. sizes.

**Testing** . . . Prior to coating and tying in operations, the sections were cleaned by blowing go-devils through the pipe

# Watch your pump's Waste line



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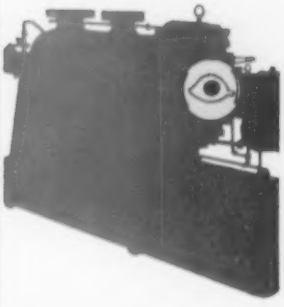

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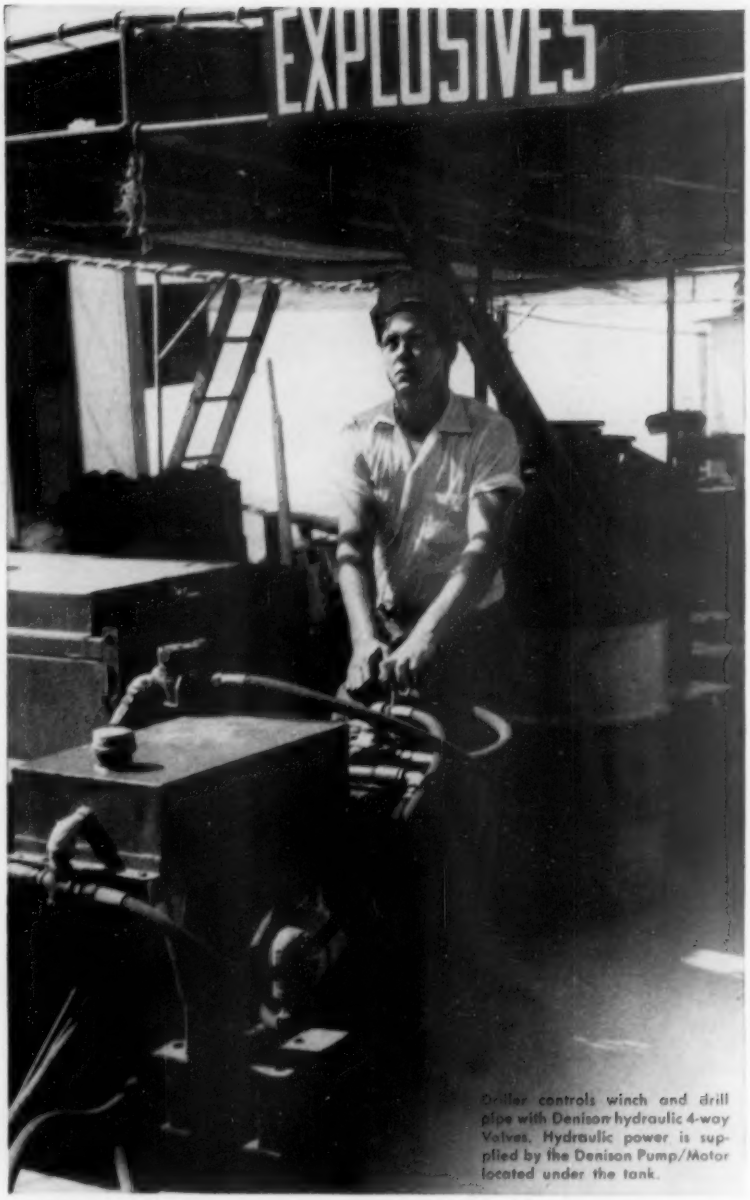
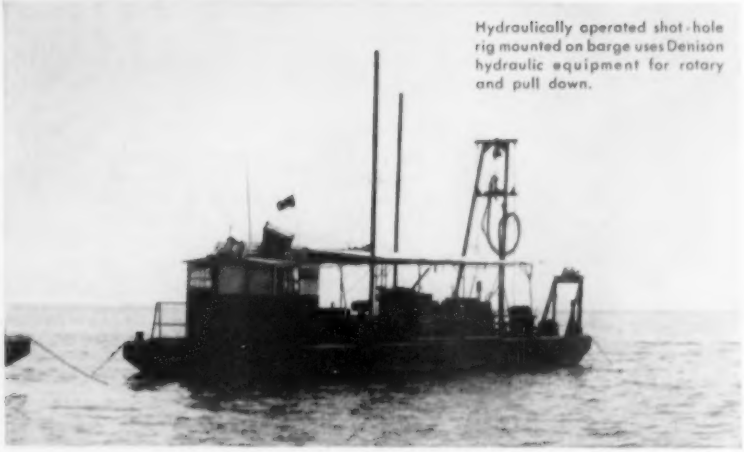


Driller controls winch and drill pipe with Denison hydraulic 4-way Valves. Hydraulic power is supplied by the Denison Pump/Motor located under the tank.


Hydraulically operated shot-hole rig mounted on barge uses Denison hydraulic equipment for rotary and pull down.

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with compressed air. Sections were then air tested at 100 psi. and welds were examined for leaks.

Final hydraulic testing was done at 1,285 psi. on the 0.312 and 0.438-in. wall pipe and at 1,020 psi. on the 0.250-in. wall pipe.

**Barrage . . .** The 0.438-in. pipe was only used at barrage crossings. (A barrage is an artificial bar or obstruction placed in a river to increase the depth of the water or to divert it into a channel).

At the Lloyd barrage crossing at Sukker, the pipeline, protected by casing, was threaded through concrete piers. This required cutting through the piers to provide for installing the casing. In all, 67 piers were pierced for 20-in. casing. Of these 60 are 10 ft. thick and 7 are 30 ft. thick. The casing was grouted in the piers.

After the casing was installed in the piers, the pipe was threaded through the casing while it was supported on slides. This barrage job was subcontracted to Cementation Co., Ltd.

At the Kotri barrage crossing the pipe was carried within a steel box framework supported from the cutwater concrete piers of the barrage.

**River and canal crossings . . .** Where water crossings are short, the line was laid on the bottom and weighted with concrete saddles.

At wider crossings, pipe was carried on steel pile supports (broad flanged beams) at 50-ft. intervals with walkway shades over the pipe.

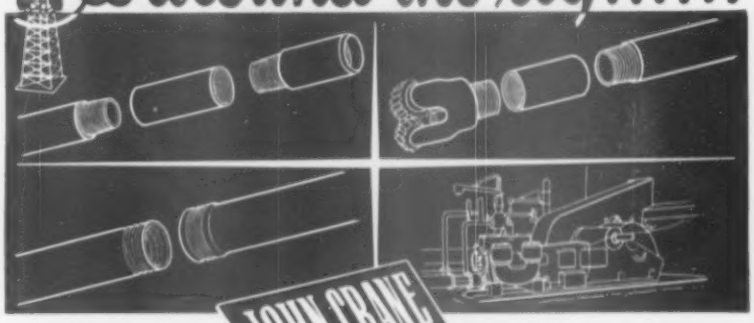
There were a dozen canal crossings longer than 250 ft. as well as 45 smaller ones.

**Railroad and highway crossings** were made by boring and sleeving with 20-in. o.d. steel casing, primed and covered with a flood coat of coal-tar enamel. Retaining straps and Williamson seals were fitted at the ends of the casings.

**Gathering and lateral lines** and the gas-purification plant at Sui were built by Motherwell Bridge Contracting & Trading Co., Ltd. ("Mothercat"). This firm also built housing and terminal buildings at Karachi. Gathering and lateral lines consisted of a total of 53 miles of 4, 6, 10, and 16-in. pipe. For such line construction and plant equipment the material from the United Kingdom cost $2,002,000 and from the United States $1,372,000.

**Distribution of the gas** at Karachi is handled by Karachi Gas Co., Inc., incorporated in October 1955. Its objective is to extend industrial and domestic distribution. This company has acquired from Sui Gas Transmission Co. the pipelines to Landhi—a major industrial center. Present industrial consumption is about 30,000,000 cu. ft. daily.


All around the rig.....



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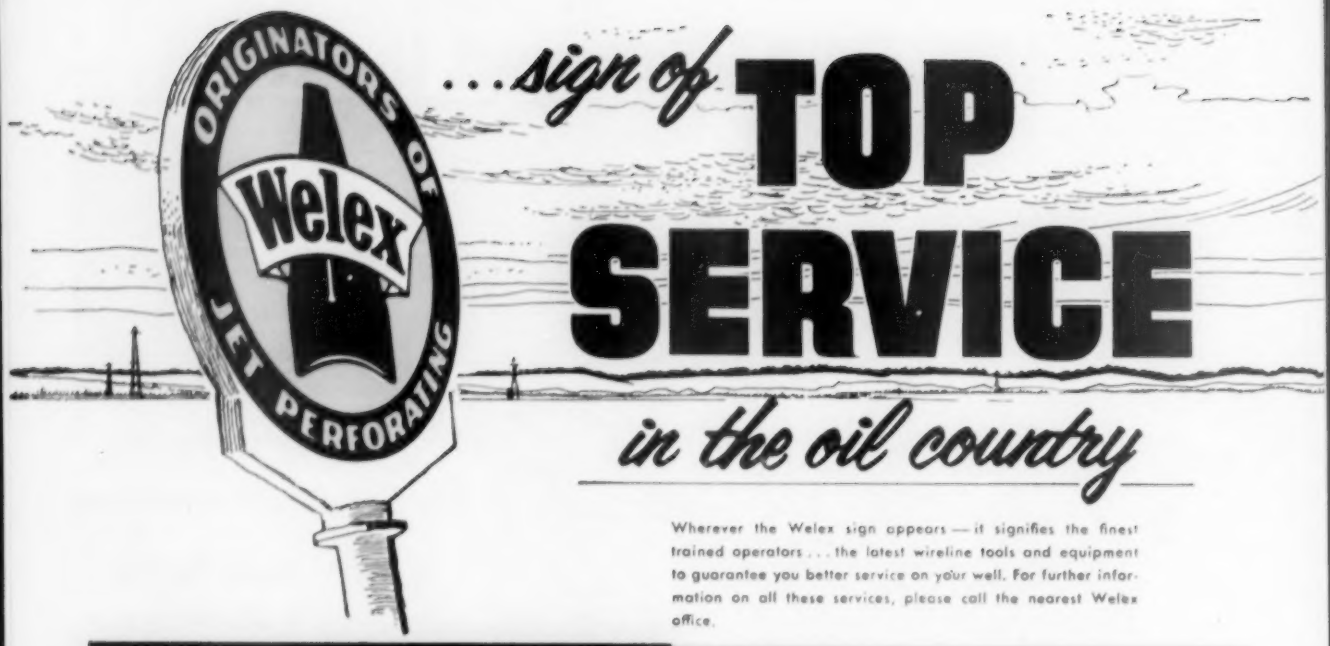


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## Among the

# Drilling Contractors

**B. M. McGraw Drilling Co.,** Oklahoma City, has contracted for a 7,500-ft. test to be drilled for Reynolds Mining Corp., of Houston, at a wildcat location 4½ miles southeast of Greenwood, and about 20 miles southeast of Fort Smith, in Sebastian County, western Arkansas. Location at 1 Turner, in 27-6n-30w, is 2¼ miles east of the discovery well of the new Gragg field.

**Chance Drilling Co.,** Houston, has scheduled a 9,500-ft. test for Union Oil Co. of California. It is being drilled at a wildcat location 6 miles southwest of Conroe, in Montgomery County, Texas Gulf Coast. Location, at 1 McMahan, in the John B. Thomas Survey, is about a mile northeast of the Tamina area, and about 2 miles northwest of the Springer area.

**Paul Cormier** has contracts for three more wells Texkan Oil Co. will drill in Orange field, 6 miles west of Orange, in Orange County, Southeast Texas. First of the three, now drilling, is 3 Kirby Granger. All are in the William Dyson Survey. Contracts are for 5,000 ft.

**Casner & Bentz,** Oildale, Calif., will drill another test for Reserve Oil & Gas Co. on its Butler-Wehr lease 2 miles northwest of Tejon field, southeast of Bakersfield, in Kern County, California. The new test, 72-20 Butler-Wehr, is northeast of the operator's first test (No. 63-20), abandoned last August at 9,537 ft., but which encountered good oil shows in the Olcese zone above 7,600 ft. The new test is projected to this depth.

**Appling Drilling Co.,** El Campo, Tex., has a rig under contract to Sam G. Harrison for a 7,500-ft. test, now drilling, at a wildcat location southwest of Neils Carlsen field, 12 miles southwest of El Campo, in Wharton County, Texas Gulf Coast. The test is Harrison's 1 Goor, in the M & C Survey 3. Production of Neils Carlsen field is from a 5,200-ft. sand.

**Edwards & Bissett Drilling Co.,** Almeda (Houston), Tex., will drill a 10,500-ft. test at a wildcat location 1½ miles north of Old Ocean field, in Brazoria County, Texas Gulf Coast. It is a contract job for J. M. Flaitz and R. B. Mitchell at 1 Reynolds. Location is in the Johnson, Walker & Borden Survey.

**Tine Gaiser Drilling Co.,** Bakersfield, Calif., has scheduled an 8,500-ft. test to be drilled for Howard H. Bell, Jr., at a wildcat location in the Tejon Flats area, 3½ miles north of Tejon field, in Kern County, California. Location is on the operator's Rudnick-Klipstein lease, in 8-11-19.

**Carmack Drilling Co.,** Denver, has contracted with Carter Oil Co. for a rank wildcat test to be drilled on Cedar Mesa, west of Blanding, in San Juan County, southeastern Utah. The test is

E. R. Muckelrath (top left), tool pusher for Penrod Drilling Co., Shreveport, with two of his crews on a rig his company is operating in North Andrews field, Andrews County, West Texas. Crewmen, left to right, are: Top row, W. M. Winn, driller; Edgar Woods, derrickman; J. J. Sutter, M. M. Presley, and W. B. Banta, floormen; and, bottom row, W. K. Duke, driller; W. C. Cox, driller; L. M. Pipkin, derrickman; C. H. McLeod, N. C. Johnson, and C. P. Dart, floormen.


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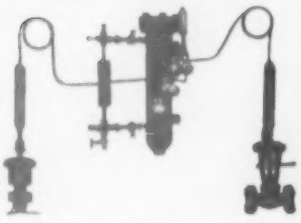

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listed as 1 Ryan, with location in 14-38s-18e. It is 30 miles northwest of Desert Creek field.

**T. J. Johnson Drilling Co.,** Tyler, Tex., is starting a Tuscaloosa test 1½ miles south of Gilbert, in southern Franklin County, northeastern Louisiana. It is being drilled for the account of T. J. Johnson, owner of the contracting company, and L. E. Smith, and L. G. Cameron, of Shreveport. Location is for 1 Ezell, in 16-12n-8e. It is 6 miles northeast of the new Metropolis field. Objective is expected about 7,500 ft.

**Woolf & Magee,** Tyler, Tex., are drilling for E. C. Wentworth and associates at 1 Liddell-Brown Unit, a wildcat test in 38-9n-1e, 2 miles southwest of Fayette field, 5 miles northwest of Fayette, in Jefferson County, southwestern Mississippi. It is a Wilcox test with expected depth of about 6,000 ft.

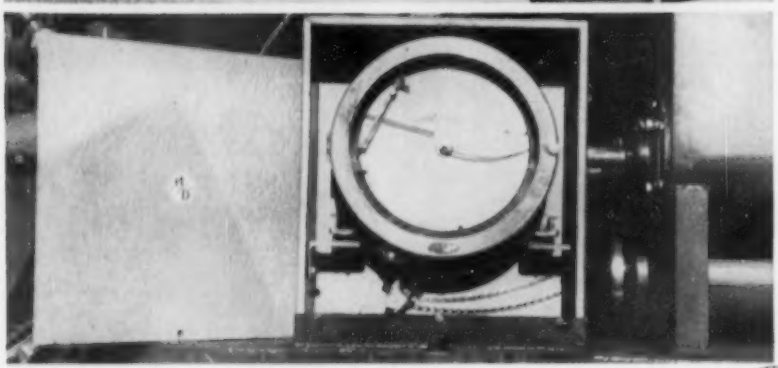
**Perry Hanson Drilling Co.** has contracts for two new wildcat tests R. W. McDowell, Jr., and associates will drill in the Forkes area, of Kimball County, southwestern Nebraska. First of these test to drill is 1 State 778, in 16-13n-58w, 4 miles north of Forbes. The other will be at 1 State 502, in 36-13n-59w, 3 miles northwest of town.

**Don Crosby Drilling Co.,** Houston, has contracted for a 9,500-ft. well to be drilled for Temple Hargroves and associates on the old Section 28 salt dome, in St. Martin Parish, Coastal Louisiana. Location, at 1 Stuart, in 29-9s-7e, is on the west flank of the dome.

**Cook Drilling Co.,** Fort Worth, has taken on a contract for a 13,000-ft. Lower Cretaceous test Continental Oil Co. is getting ready to put down 4 miles southwest of New Hebron, in northeastern Lawrence County, Central Mississippi. Continental carries the operation as 1 Gaylord with spot location in 30-9n-20w.

**Cimarron-Western Drilling Co.,** Tulsa, has contracted for a Dakota wildcat test to be drilled in southeastern Washington County, northeastern Colorado, for Landauer and associates. Location, 1 Small, in 2-3s-50w, is 4 miles southeast of DeNova, and about 6 miles northeast of the Rush-Willadel area.

**Allen & Morris,** San Antonio, have a rig working for Sunray Mid-Continent Oil Co. on a wildcat location in southern Refugio County, South Texas. Location, listed as 1 Hartman, is 3½ miles northwest of Bayside, on the north shore of Copena Bay, in Elisha Maxey Survey. Contract is for 7,000 ft.



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# Pipeline Patrol

*. . . Report on Construction*

## Under Way, Contracted, and Planned

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by • preceding the job.

### Crude-Oil Pipelines

• **Big Horn Pipe Line Co.**—Firm has asked Wyoming Public Service Commission for permission to build a 150-mile, 8-in. crude-oil line from Ash Creek field, Wyoming, to a connection with Service Pipe Line Co.'s line at Midwest, Wyo.

• **Lakehead Pipe Line Co., Inc.**—Company plans to loop part of present system with 51 miles of 26-in. line. The job will be completed about August 31, 1956, and is in conjunction with 69 miles of 24 and 26-in. looping that Interprovincial Pipe Line Co. will also complete in August. (See Interprovincial under Canada, also).

• **Offshore Gathering Corp.**—This Houston company has proposed to build a natural-gas and a crude-oil line to gather gas and crude in the Gulf of Mexico off Louisiana. The gas line will be comprised of 60 miles of 24-in., 70 miles of 26-in., and 234 miles of 30-in. The crude line will be mostly 20-in. Each line will be about 364 miles in length. Estimated cost of the lines is $150,000,000.

**Pasotex Pipe Line Co.**—Company has let contract to McVean & Barlow and River Construction Corp. for 68 miles of 20-in. looping of its Wink, Tex., to El Paso crude line. The line will partially replace two existing 8-in. lines. Completion set for first of year.

**Salt Lake City Pipe Line Co.**—Engineers Limited Pipeline Co. has contract to lay 82 miles of 10-in. line to loop the present Rangely, Colo., to Salt Lake City system of this company. The job will be finished about the first of the year.

• **Sinclair Pipe Line Co.**—Company will build a 300-mile crude line form Jacksboro, Tex., to Houston. The project will cost $14,000,000 and require 3 years to complete. The 150-mile portion from Jacksboro to Mexia will be 18-in. pipe. The Mexia-Houston portion will be 20-in.

• **Union Oil Co. of California.**—Company proposes to build an 815-mile line from Rifle, Colo., to Los Angeles to carry the products from its proposed Rifle, Colo., shale-oil plant to the Los Angeles refining area. The line would cost approximately $56,000,000.

• **U. S. Defense Department.**—Defense officials are considering a 97-mile, $8,000,000 line from the Elk Hills Naval Reserve in California to the Los Angeles refining area.

• **West Coast Pipeline Co.**—The off-again-on-again plans for this crude line from near Wink in West Texas to near Norwalk in California are presently before the Office of Defense Mobilization. A three-man board of nonindustry members has recommended that the project be dropped. They questioned the ability of West Texas to produce enough crude to supply both the East and West Coasts in time of war. The three-man board favored building a line from California's Elk Hills Naval Reserve to be held in standby for possible future need.

### Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

• **H. W. Bass & Sons, Inc.**—Company is planning on a 152-mile, 4-6-in. L.P.G. line from Goliad Corp.'s plant in Live Oak County, Texas, to Corpus Christi.

• **Cosden Petroleum Corp.**—Company will build 100 miles of 6-in. line from its refinery at Big Spring to Abilene, Tex.

• **International Pipe Line, Inc.**—132 miles 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost $4,200,000.

**Magnolia Pipe Line Co.**—H. B. Zachry Co. and O. R. Burden Construction Co. are winding up work converting 337 miles of 8-in. and 237 miles of 10-in. from crude to L.P.G. service. Work will be completed December 31.

• **Phillips Chemical Co.**—Firm plans a 50-mile, 4-in. ethylene line from Sweeny, Tex., to Port Adams, Tex. The estimated date of completion is set for October 1, 1956.

• **Phillips Pipe Line Co.**—Firm plans 64-mile, 12-in. products line from Sweeny to Houston. Completion set for April 1956.

• **Phillips Petroleum Co.**—Firm has bids out for 40-mile, 4-in. gasoline line from Lindsay, Okla., to Oklahoma City. Completion set for last of January 1956.

• **Sioux Oil Co.**—Firm plans to build 80-mile, 4½-in. line from its Newcastle, Wyo., refinery to Rapid City, S. D. The line is slated for completion in late 1956.

**Southern Pacific Pipe Lines, Inc.**—Company has completed more than 700 miles of its 842-mile products line between Los Angeles-Phoenix and El Paso-Phoenix. The only pipe laying left is between Phoenix and Yuma and between La Habra and Beaumont in California. All pipe should be in the ground by January.

• **Sun Pipe Line Co.**—Firm will build 110 miles of 14-in. from Twin Oaks, Pa., to Newark. The line will have a 83,000-bbl. capacity and will replace an existing 8-in. line. September 15, 1956, is expected completion date.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport L.P.G. from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

**Texas Eastern Transmission Corp.**—Company has received Federal Power Commission approval to abandon the "Little Inch" gas line and to convert it to products service. The company will spend $13,000,000 converting the line back to products. When finished the line will have a capacity of 235,000 bbl. daily.

### Non-Petroleum Pipelines

**American Gilsonite Co.**—Company has announced plans for a 100-mile pipeline from near Bonanza, Utah, to a proposed gilsonite


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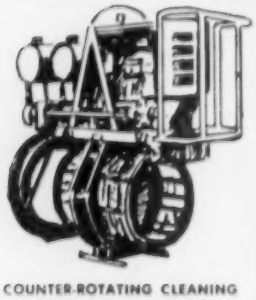

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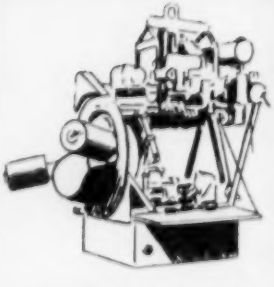

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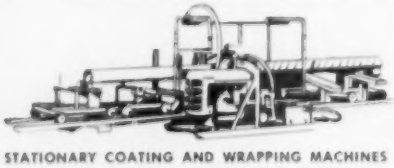

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## Pipeline Patrol

refinery in western Colorado. The company, owned by Barber Oil Corp. and Standard Oil Co. of California, plans to make gasoline and coke by refining gilsonite. The gilsonite would be moved in a slurry.

**Pittsburgh Consolidation Coal Co.**—This firm has announced plans for the first pipeline to move coal. The line will be 108 miles of 10-in. from the company's Georgetown mines in eastern Ohio to Cleveland Electric Illuminating Co.'s Eastlake power plant northeast of Cleveland. Construction will start this fall. Ford, Bacon & Davis, Inc., will issue specifications, let contracts, and supervise the construction work. Williams Bros. has contract.

### Natural-Gas Pipelines

**Alabama-Tennessee Natural Gas Co.**—Midwestern Constructors, Inc., has contract to lay 21 miles of 12-in. natural-gas line from Little Bear Creek, Colbert County, Alabama, to the Mississippi state line. Job will be completed December 31, 1955.

**American Louisiana Pipe Line Co.**—Company has let bulk of its 1,121-mile line from North Tepetate, La., to Detroit. Only a 22-in. spur from Payne, Ind., to Bridgman, Mich., is still not awarded. H. C. Price Co., Bartlesville, Okla., has 783 miles of 30-in. pipe. One section will work south from the Hancock-Henry County line and the other will work north from Slaughters, Ky. Brown & Root has 221 miles of 30-in. from North Tepetate to the Louisiana-Arkansas border, and 39 miles of 16-in. line to be built under water. The firm has subcontracted the 221 miles to Associated Pipe Line Contractors and Western Contractors. It will lay the under-water line itself.

- **Carolina Natural Gas Corp.**—185 miles 8-12-in., proposed lateral lines off Transcontinental in North and South Carolina.
- **Cities of Clarendon and Marvell, Ark.**—Cities have filed for FPC permission to interconnect their facilities with Texas Gas Corp.'s line south of Helena, Ark. The cities will build 53 miles of 4, 5, and 6-in. line to transport the gas.

**Cities Service Gas Co.**—Firm is winding up work on three separate projects:

R. H. Fulton completed 90 miles of 26-in. from Blackwell, Okla., to Independence, Kans., about December 15.

Vaughn & Taylor Construction Co. is laying 22 miles of 20-in., 15 miles of 16-in., 65 miles of 8-in., 14 miles of 6-in., and 29 miles of 4-in. from Alva, Okla., to gas fields in Barber County, Kansas. Job is to be finished by first of year.

M. A. Moore Construction Co. is laying 123 miles of 4, 6, 8, and 10-in. pipe in the Hugoton gas field in Kansas. The job will connect 87 gas wells and will be finished by the first of the year.

- **Coastal Transmission Co.**—Company plans to build 550 miles of 30-in. line from near McAllen in South Texas to near Baton Rouge (See Houston, Texas Gas & Oil Co.)
- **Colorado Interstate Gas Co.**—Firm completed 136 miles of 22-in. from Laramie, Wyo., to Denver in November. Second part of line from Laramie to Rock Springs, Wyo., will be laid in 1956. The second section will be 238 miles of 22-in. pipe and will be completed about October 1.
- **El Paso Natural Gas Co.**—Firm has received FPC permission to loop 300 miles of 34-in. line from the San Juan basin to the Colorado River at the Arizona-California border.
- **Houston Texas Gas & Oil Co.**—Company has applied to FPC for permission to lay a 960-mile gas line between Baton Rouge and Miami. The main line would consist of 507

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## Pipeline Patrol

miles of 30-in., 157 miles of 26-in., 61 miles of 20-in., 224 miles of 18-in., and 12 miles of 12-in. Company also plans 500 miles of sales laterals in Florida. Main line would join with Coastal Transmission's proposed line from McAllen to Baton Rouge.

• **Iron Ranges Natural Gas Co.**—This St. Paul company has filed an application with the FPC to build a 68-mile transmission line and 47 miles of laterals to supply various towns and cities on the Mesabi Iron Range in Minnesota.

• **Lone Star Gas Co.**—Company has two plans up before FPC to enlarge its system in Texas and Oklahoma. One is for an $18,000,000, 230-mile line from Cotton County, Oklahoma, to Fritch, Tex. The other plan is for a 205-mile line from Snyder, Tex., to a hookup with the Cotton-Fritch line. The company hopes to prevent Natural Gas Pipeline Co. of America from building its line from Wise County, Texas, to Fritch (see below).

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in loops. Majority will be in Wisconsin.

• **Midwestern Gas Transportation Co.**—Company will build a main line from Portland, Tenn., to Canadian border near Emerson, Man., Canada. Extensions from main line to cities in Minnesota and Wisconsin are also planned. The main line will be comprised of 829 miles of 24-in., 109 miles of 16-in., and 174 miles of 12-in. The extensions will total 648 miles of 3 to 18-in. pipe. The application is now pending with the FPC.

• **Montana-Dakota Utilities Co.**—Company has FPC authority to construct 44 miles of pipeline and 1,090 hp. in compressor capacity on its system in South Dakota and Wyoming. Estimated cost would be $1,414,218.

• **Natural Gas Pipeline Co. of America**—Company now before FPC on plans to build 350 miles of 20 and 26-in. line from Wise County, East Texas, to its station 111 at Fritch, Tex.

**Nevada Natural Gas Co.**—Company plans looping program along its 114-mile line from Needles, Calif., to Las Vegas, Nev. Mileage and size are unknown but cost will be about $2,500,000.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia to Narrows and Dublin, Va.

• **North Carolina Natural Gas Corp.**—This subsidiary of Colonial Natural Gas Corp. (formerly Texas-Ohio Gas Co.) has received permission from the North Carolina Utilities Commission to build 575 miles of gas lines in the state. The system will range in size from 3 to 16-in. and will cost about $13,000,000. The line will run from a point on Transcontinental Gas Pipe Line Corp.'s system near Mooresville, eastwardly across North Carolina. It will deliver gas to customers in a territory lying east of Charlotte and south of Lexington, Sanford, and Raleigh.

• **Northern Natural Gas Co.**—Company plans to spend $32,000,000 to add 348 miles of main line and 307 miles of branch lines in Wisconsin, Minnesota, South Dakota, and Iowa. The application is before the FPC now. The main lines include 169 miles in the Duluth-Superior area and 164 miles in the Aberdeen area of South Dakota.

• **Pacific Gas & Electric Co.**—Company's long-range plans call for looping the Topock-Milpitas line with 135 miles of 34-in. The major part of the line will be laid in 1956, while 62 miles will be laid in 1957.

**Pacific Northwest Pipe Line Corp.**—Firm has let the initial contracts of its 1,446 miles

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### FASTER SPEED FOR STRINGER BEADS

**Fleetweld 5-P** (E-6010) gives deep and uniform penetration, vertical up or vertical down for root pass in pipe. Specially suited for applications requiring good wash-in, lower currents, speedier arc action.

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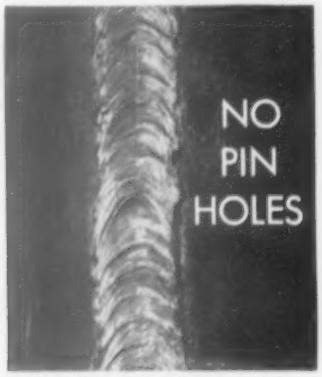


**No Pin Holes or Windows** *on cover pass made with Shield-Arc 85-P.*

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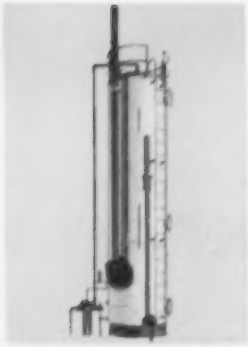
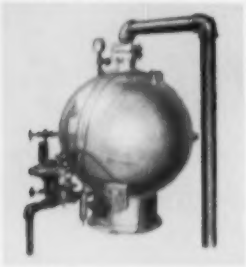
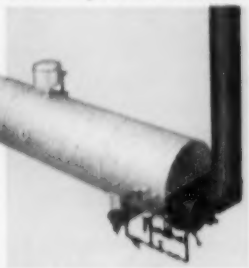


Delta Emulsion Treater



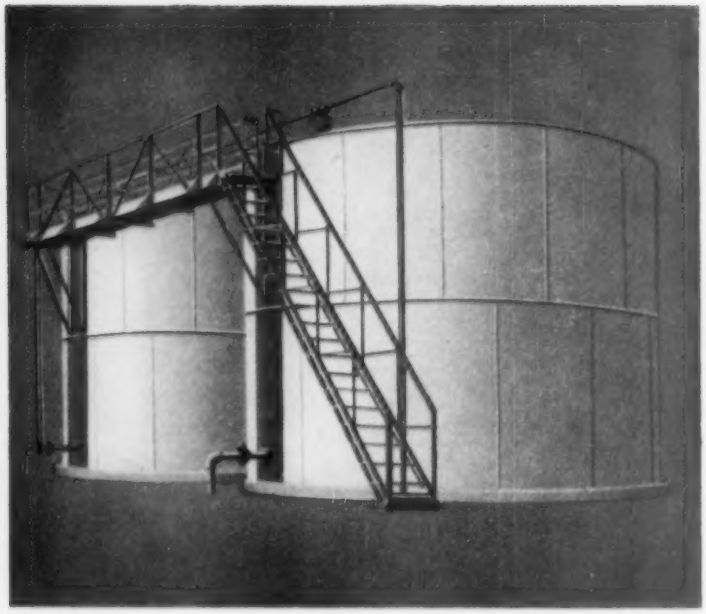
Delta Spherical Separator *(Patent Pending)*



Delta Indirect Heater

Delta Bulk Storage Bin

Delta's Main Plant at Baton Rouge, La.



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## Pipeline Patrol

gas line from the San Juan basin to Bellingham, Wash. The first contracts total $11,236,000. Contractors and their sections are

River Construction Corp., two sections totalling 150 miles of 26-in. between Ignacio Colo., and Moab, Utah.

R. H. Fulton Co., two sections totalling 160 miles of 26-in. between Moab and Jensen, Utah.

Associated Pipeline Contractors, Inc., one section of 77.6 miles of 26-in. between Jensen and Green River, Wyo.

A. J. Curtis Construction Co., one section of 82.8 miles of 22-in. from Green River to Sage, Wyo. Completed.

B & M Construction Corp., one section of 90 miles of 22-in. between Sage and Lava Hot Springs, Idaho.

Midwestern Constructors, Inc., one section of 95 miles of 22-in. from Hot Springs to Burley, Idaho.

H. B. Zachry Co., San Antonio, sections 9 and 10, 214 miles of 22-in. between Burley and Payette, Idaho.

Fulghum Construction Co., Harrisburg, Pa., sections 11 and 12, 198 miles of 22-in. between Payette and the Columbia River at the Oregon-Washington border.

A. J. Curtis Construction Co., Casper, section 26, 54 miles of 16-in. laterals and 31 miles of gathering-system lines from a point on the main line near Kemmerer, Wyo., to Big Piney field, Wyoming.

R. H. Fulton, Lubbock, section 27, 43 miles of lateral lines and 16 miles of gathering lines from Rangely, Colo., to Piceance Creek field, Colorado.

**Panhandle Eastern Pipeline Co.**—R. H. Fulton is laying 19 miles of 24-in. line in the Rolla and Hugoton fields of Kansas. Line will be completed by December 31.

**Phillips Petroleum Co.**—Vaughn & Taylor has contract for 120 miles of 2 through 30-in. gas gathering lines in Garvin, Grady, and McClain counties of Oklahoma. Job will be finished in January of 1956.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

**Private Interests.**—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design estimated the line would cost $20,000,000, although later figures have been much higher than this.

• **Southern California Gas Co.** and **Southern Counties Gas Co. of California.**—Firms have plans for three separate jobs. First is 19 miles of 30-in. from Placentia to Compton, Calif. Completion set for November 1956. Second job is 70 miles of 30-in. from Palmdale to Alhambra, Calif., and completion is slated for November, too. Third job is 210 miles of 30-in. from Topock to Palmdale. Last job not expected to be finished before April 1957.

• **Southern Natural Gas Co.**—Company has temporary FPC authority to build 39 miles of loop lines and add 4,950 hp. to the compressor power near Atlanta, Ga. Job will cost about $2,000,000.

**Tennessee Gas Transmission Co.**—The firm has the following projects under way or planned.

**Project 1**—370 miles of 30-in. line from Agua Dulce, Tex., to Kinder, La. Completion set for December 31, 1955. Contractors are Morrison Constructors, Inc.; Williams Bros.; Houston Contracting Co.; H. C. Price Co.; Western Constructors; N. A. Saigh Co.; Panama-Williams Co.; and Associated Pipe Line Constructors, Inc.

**Project 2**—250 miles of 24-in. from Cou-

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## Pipeline Patrol

dersport, Pa., to Greenwich, Conn. Contractors are H. C. Price, Bechtel Corp., and Pentzien, Inc. Completed.

**Project 3**—147 miles of 26-in. and 74 miles of 30-in. Thirty runs from Cave City, Ky., to Danville, Ky. Twenty-six-inch runs from a point north of the Ohio River to McConnellsville, Ohio, and from Newcomerstown, to near Lisbon, Ohio. Approved by FPC but not yet contracted. Completion set for fall of 1956.

**Project 4**—192 miles of 24-in., 34 miles of 20-in., 15 miles of 18-in., and approximately 110 miles of 4, 6, 8, 10, and 12-in. from point west of Crowley, La., looping the Bayou Sale gathering line for a distance of 74 miles to a point near the mouth of the Mississippi River. Job not yet contracted. Completion set for summer of 1956.

**Project 5**—63 miles of 30-in. and 99 miles of 26-in. Thirty-inch will run from Scottsville, Ky., to Cave City, Ky., and from point southwest of Danville, Ky., to a point northeast of Danville. Twenty-six-inch will run from near Greenup, Ky., to just north of the Ohio River; from McConnellsville to near Newcomerstown and from Lisbon to Mercer, Pa. Application pending with FPC.

**Project 6**—Approximately 100 miles of 4, 6, 8, 10, and 12-in. gathering lines in the Gulf Coast area of Texas and Louisiana. Application pending with FPC.

(For news of a Tennessee subsidiary see Midwestern Gas Transmission Co.)

**Texas Eastern Transmission Co.**—Company has received FPC permission to begin converting its Little Inch line from natural gas to products service. Company has also proposed to Mobilization Director Arthur S. Flemming that the Government give it accelerated amortization on money to invest to put the Big Inch line on standby product service. The company's program is:

... To convert the Little Inch to products with a capacity of 235,000 bbl. daily and to install enough standby pumping equipment to hike the capacity to 375,000 bbl. daily if needed.

... To install standby pumping equipment along the Big Inch that would allow the line to be converted from gas to products in an emergency. The line would have a capacity of 425,000 bbl. daily.

Company has recently finished a 382-mile, 10-in. line from Beaumont, Tex., to Kosciusko, Miss. Firm also is considering importing Mexican gas and building a 400-mile line from the border into Beaumont.

Company also has 110 miles of 3, 4, 6, 8, 10, and 12-in. pipe being laid in Texas, Louisiana, Arkansas, Pennsylvania, and Mississippi. Work will be completed in early 1956.

• **Texas Gas Transmission Corp.**—Company has received authority from a FPC examiner to build a 105-mile supply line extending from East Lake Palourde Gas field in Assumption Parish, Louisiana, to its system in Arkansas, Mississippi, Tennessee, Kentucky, and Indiana. The lines and additional compressor facilities totaling 19,190 hp. will cost about $20,000,000.

• **Colonial Natural Gas Corp.**—Company proposes to build two systems, one from the Houston-Lake Charles area to Miami, Fla., and the other in the Carolinas and Georgia. Neither idea is before the FPC yet.

• **Transcontinental Gas Pipe Line Corp.**—Company received FPC permission on November 29 to construct 24 miles of line to gather gas from South Bayou Mallet, Maxie, and Happytown fields of Louisiana. The project will cost approximately $754,000.

**Transok Pipe Line Co.**—Company has let contract to Pipe Line Service Co., Seminole, Okla., to lay a 140-mile, 24-in. line from Garvin County, Oklahoma, to Tulsa. The firm will also build a gathering system in the Bradley, West Lindsay, and Northwest Purdy fields.

• **Trunkline Gas Co.**—Firm has applied to FPC for authority to build eight new compressor stations and 24 miles of pipeline on its transmission system to enable it to sell additional gas to Panhandle Eastern Pipe Line Co. Total capacity of the new stations would be 56,000 hp. Total cost would be $18,700,000, including $1,000,000 for gathering facilities in the Gulf Coast area. Panhandle filed for 1,600 hp. additional compressor capacity to cost $3,714,000.

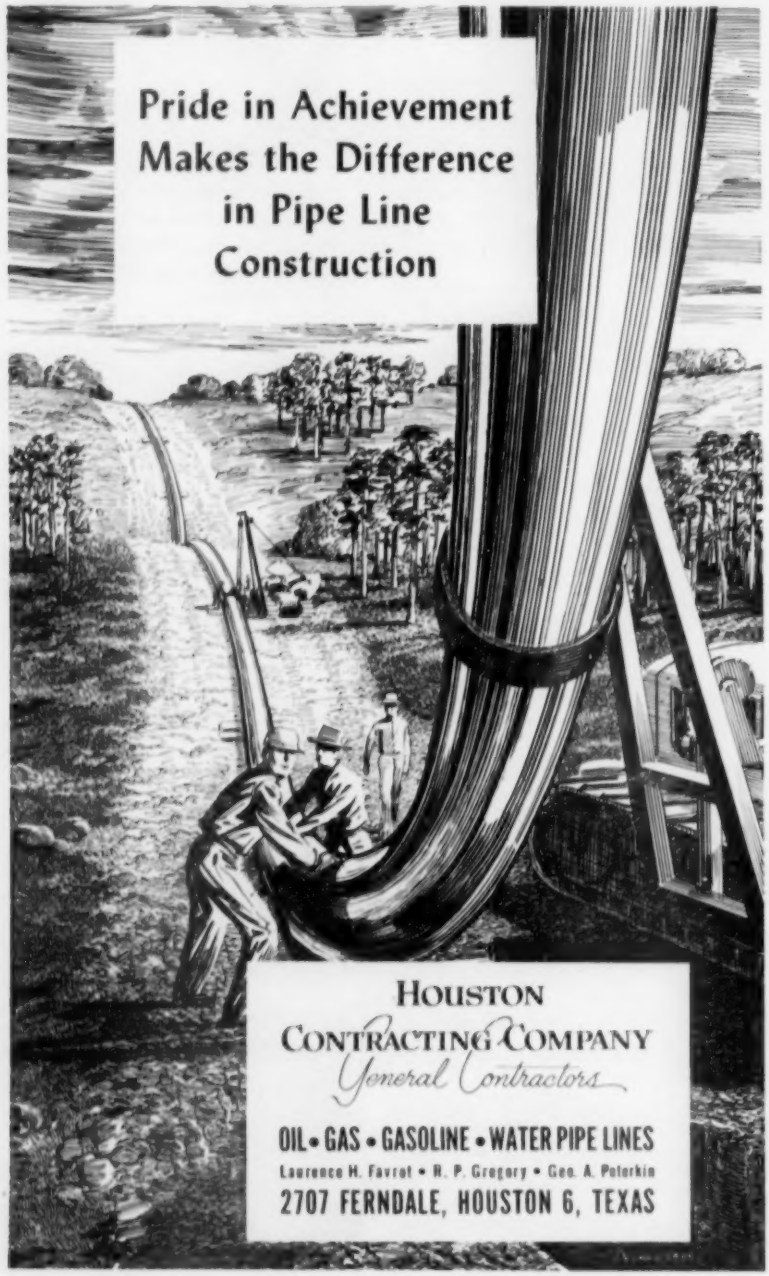
**United Gas Pipe Line Co.**—Firm is winding up two jobs at present. Panama-Williams Corp. will finish 34 miles of 16-in. from Baxterville, Miss., to Petal, Miss., around December 15. Western Pipe Line, Inc., will complete 21 miles of 20-in. from Mobile to Pensacola, Fla., about the first of the year.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not yet let.

### Foreign Crude-Oil Pipelines

• **Cremona Pipe Line Co.**—Firm has announced plans for a 60-mile crude-oil line from the Westward Ho-Sundre area to Calgary.

• **Esso, A. G.**—West Germany affilate of Standard Oil Co. (N. J.) plans line from North Sea port to Rhur-Rhine area. This will probably be 120-mile, 10-in. from Rotterdam to Cologne, the latter rumored as the site of a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## Pipeline Patrol

new 58,000-bbl. refinery to be built by the company.

• **Interprovincial Pipe Line Co.**—Firm will loop 67 miles of 24-in. line and 2 miles of 26-in. along its system from Alberta to Sarnia, Ontario. The job is slated for completion August 1956. (See Lakehead under domestic crude, too).

• **Pembina Pipe Lines, Ltd.**—Company has announced proposal to build crude-oil line from Sundre-Westward Ho area of Alberta into Edmonton. Two other companies, Cremona Pipe Line Co. and Rangeland Pipeline Co. also have plans for moving the area's crude.

• **Rangeland Pipe Line Co.**—Subsidiary of Hudson's Bay Oil & Gas Co. has made proposal to build line out of Sundre-Westward Ho area to connect with a line of Texaco Exploration Co. and then go to connections with Trans Mountain and Interprovincial.

• **Standard - Vacuum Oil Co.** — Company has long-range plans for a 90-mile pipeline to give the new Lirik field in Central Sumatra an outlet. Completion is not scheduled before 1957 or 1958.

**Westspur Pipe Line Co.**—Firm has received government permission to build a 109-mile crude line from Midale, Sask., to the Interprovincial Pipeline Co.'s system at Cromer, Man. The project will cost $6,400,000.

### Foreign Products Pipelines

• **Chaco Pipeline & Refinery Corp.**—Firm plans to build 450-mile line from Glen McCarthy's wells in Bolivia to a new refinery to be built at Concepcion, Paraguay.

• **Iraq Petroleum Co., Ltd.**—Company is making plans to lay a 75-mile, 24-in. products line from Homs, Syria, to Tripoli, Lebanon. The line would have a capacity of 180,000 bbl. daily.

• **National Fuel Oil Co.**—This company in Israel is a shareholder in a company which plans to build a products line between Haifa and Tel Aviv. The plans call for a 55-mile 6-in. line in which the Government would own 10 per cent.

• **National Iranian Oil Co.** — Company plans $32,300,000, 573-mile, 10-in. products pipeline from Ahwaz to Teheran, Iran. The line will have a capacity of 40,000 bbl. daily. Costain-John Brown, Ltd., London, will build the 337-mile southern part. Entrepose, Paris, will build the northern 236 miles.

• **North Atlantic Treaty Organization (NATO).**—This defense organization is building products lines to airforce bases in various parts of France. Approximately 2,000 miles of 4-in. line will be laid.

**NATO**—Associated Pipeline Contractors Inc., Houston, is laying 450 miles of products line from Iskenderun, Turkey, to Batman, also in Turkey.

**Overland Pipeline Corp.**—This South African firm has requested government permission to build a 350-mile line, to cost $8,450,000, from the South African coast to Rand, a plateau area in southern Transvaal where there is heavy petroleum consumption.

• **Sinclair Oil Corp.**—Company is considering a 240-mile crude-oil line from its San Silvestre field in the state of Barinas, Venezuela, to Puerto Cabello on the Caribbean Sea coast. The line would cost $25,000,000.

**U. S. Defense Department.**—U. S. Defense Department is sponsoring a 485-mile, 8, 10, 12-in. products line from Cadiz to Zaragoza, Spain. The contract has been let to Merritt Chapman & Scott; Benson & Monun of Oklahoma City; and Agroman Construction Co., a Spanish firm. Brown-Raymond Walsh is the prime contractor. Cost of the line will be approximately $5,000,000.


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The time-tested coal tar coating in tape form . . . now made with Xtra coating to give you these Xtra advantages

TAPECOAT-X comes in widths of 2", 3", 4" and 6". It is easy to apply and bonds readily to the surface with the flash of a torch. Wrapping is done spirally with only ½" overlap.

**XTRA COAL TAR!** Provides additional thickness of the same high quality coal tar that has distinguished TAPECOAT since 1941.

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**XTRA SAVINGS IN MATERIAL!** Single-wrapping with TAPECOAT-X requires less material, lowers cost.

**XTRA CONVENIENCE!** New type, self-disposing liner facilitates unrolling, speeds application, never gets in your way.

**XTRA ECONOMY!** TAPECOAT-X goes farther, gives you more value for your protection dollar.

Write today for the complete facts on this timely development for protecting pipe, pipe joints, mechanical couplings, tanks and other steel surfaces vulnerable to corrosion, above and below ground.

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## Pipeline Patrol

**Winnipeg & Central Gas Co.**—Canadian company plans to build a $20 million butane-propane system. Company plans to get gas L.P.G. from Signal Oil & Gas Co.'s Tioga, N. D., plant and move it to Winnipeg. Size and route of the line has not been definitely established.

### Foreign Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co.**—Company will spend $47,000,000 to build 547 miles of gas-gathering system for the Trans-Canada line. The 1956 stage of construction will total 219 miles and cost $22,650,000. The first part would start near Saskatchewan and include Pincher Junction, Provost, Bindloss, Sibbald, Oyen, Sunnynook, Steveville, and Cessford. The second part to be built in 1957 will consist of 328 miles and cost $24,400,000. The second phase will include Countess, Duchess, Princess, Homglen-Rimbey, and Nevis.

**Attock Oil Co.**—Company plans to build 60-mile natural gas pipeline from Dhulian field to Rawalpindi in West Pakaistan.

• **Empresa Nacional del Petroleo.**—80 miles, 10-in., planned, Concon to Santiago Chile.

• **Gas Industrial de Monterrey.**—Company has announced plans for a 22-in., 130-mile natural-gas line from Reynosa to Monterrey in northern Mexico. The project will parallel a 14-in. line which has been supplying Monterrey since 1947.

• **North Canadian Oils, Ltd.**—Company will lay 316 miles of 10-in. line from Wabumun to Hinton, Alta. The gas will be sold to a pulp mill at Hinton. Mid-Western Industrial Gas, Ltd., which will supply the gas along with North Canadian, will build a line from its gas fields in the Alexander, Majeau Lake, and Westlock districts to Wabumun.

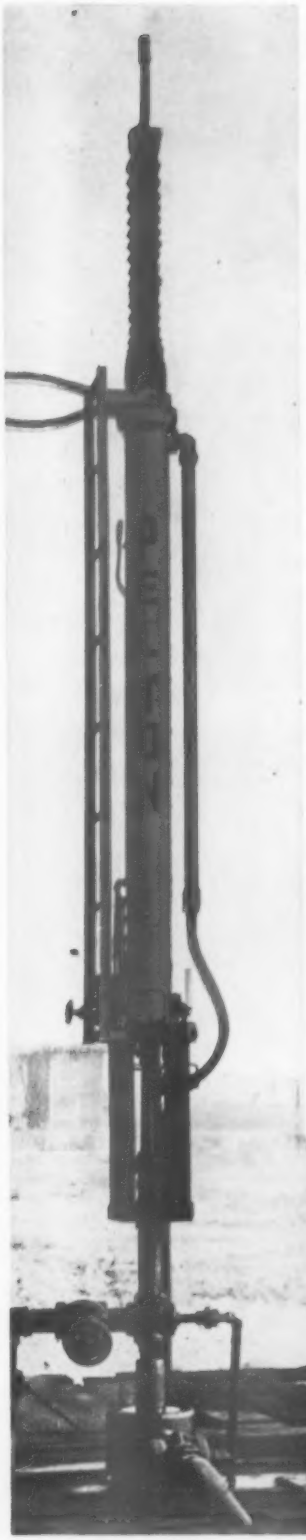
**South Alberta Pipe Line, Ltd.**—Company has filed permit to construct a 150-mile, 8-in natural-gas line from Etzikom field to serve a nitrochemical plant to be built near Medicine Hat, Alta. The line will cost about $1,000,000.

• **Sui Gas Transmission Co.**—Pakistan Constructors, a joint company of Morrison Knudsen, Boise, Idaho, and William Press Ltd., London, have contract to build a 188-mile, 16-in. line from Sui gas field to Moultan, Pakistan. Work will begin in mid-1956. The line will later be extended to Lahore with branches at Kot Addu, Jhang, Magiana and Montgomery.

• **Trans-Canada Pipe Lines, Ltd.**—Firm has about completed financing arrangements for a 2,250-mile natural-gas line from Alberta to Toronto and Montreal. The Ontario government has agreed to help finance the line through its province. Tennessee Gas Transmission Co. has proposed a line to take gas from the company at Emerson, Man. (See Midwestern Gas Transportation Co.)

**Union of Soviet Socialist Republic.**—Russian Government has completed about 200 miles of a 900-mile natural-gas line from Stavropol in the Northern Caucasus to Moscow. The completed section links Stavropol with Rostov. The line is being built of 26-in. pipe and is much larger than the other two major gas lines in Russia which are 16 and 18-in. When completed the line will serve Voroshilovgrad, Voronezh, Tula, Yelets, and Serpukhov.

**Westcoast Transmission Co., Ltd.**—Company is starting work on a 650-mile, 30-in. line from the Peace River area in Canada to Sumas, Wash. Contractors are Mannix, Ltd., Canadian Bechtel, Ltd., R. A. Conyes Construction Co., and Dutton-Williams Brothers Co., Ltd. Cost to be about $120,000,000.



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### Hydraulic Pumping Jack

### 13,000 Lb. Polish Rod Rating

Proving highly successful in medium to low production wells is this new Pelton S-6 Six Foot Stroke Hydraulic Pumping Jack. Compare the features of this jack and test it on your own wells. You will quickly discover in the Pelton S-6 a new, less expensive pumping method.

1. 6 Ft. stroke length up to 4.6 SPM.
2. 13,000 lb. maximum polished rod loading.
3. The polished rod speed can be adjusted for a slow upstroke and fast downstroke. Pump spacing easily done by adjusting polish rod clamp at top.
4. ***Power oil used to actuate the unit is completely isolated from the oil being produced and from contaminants, water, etc., which would ordinarily dilute the power oil.***
5. The SPM can be slowed down to allow efficient filling of the bottom hole pump barrel allowing the well to produce continuously. The slow SPM and continuous operation gives increased production, eliminates pump sanding and gas lock.
6. Mounts directly in 3 inch well head nipple.
7. Polish rod extension protected by accordion dust cover.
8. Large reserve oil tank with inspection plate and gauge. Low operating pressures (500 psi).
9. No gear box or vibration due to swinging weights.
10. Amazingly simple to operate and trouble free. Small and compact for easy installation and operation, yet rugged in construction.
11. Lower in price than comparable beam units.

Pelton Engineers are at your service at any time.

**Specifications S-6**

| | |
|---|---|
| Maximum Polished Rod Load | 13,000 lb. |
| Maximum Load Range | 13,000 lb. |
| Maximum Counterbalance | 0 |
| Nominal Stroke Length | 72" |
| Maximum Operating Speed (SPM) | 4.6 |

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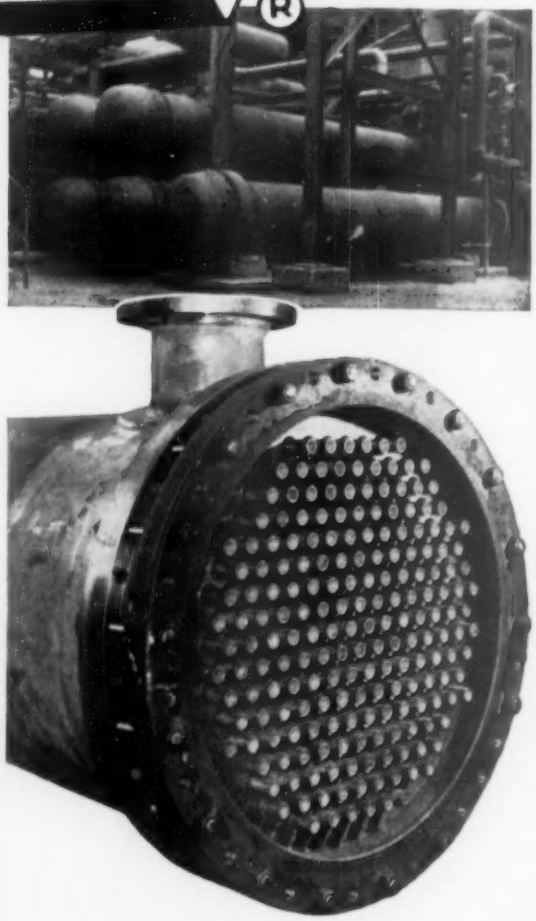
# SPENCER®



**THE PROBLEM:** One of Spencer Chemical Company's plants needed an air preheater to handle nitrogen gases at 1600°F. on the tube side, against air at 330°F. on the shell side. These widely different temperatures produced a 2" differential expansion between tubes and shell.

**ENGINEERING:** Western heat transfer engineers considered several possible solutions: a) An expansion joint in the shell; b) Individual tube packing; c) A packing gland in the shell.

**CONSULTATION:** These approaches were discussed with the Spencer engineers. After mutual examination of plant design problems, the individual tube packing method was chosen. Upon completion of the precision fitting and welding there was adequate room for expansion and contraction of the tubes within their individual packing glands.

**IMPORTANCE:** The Spencer Chemical Company job typifies Western's capabilities in working *with* the client to satisfactorily solve the specialized engineering and fabricating problems of today's high temperature, high pressure services.

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### HEAT EXCHANGERS

**WESTERN SUPPLY COMPANY**

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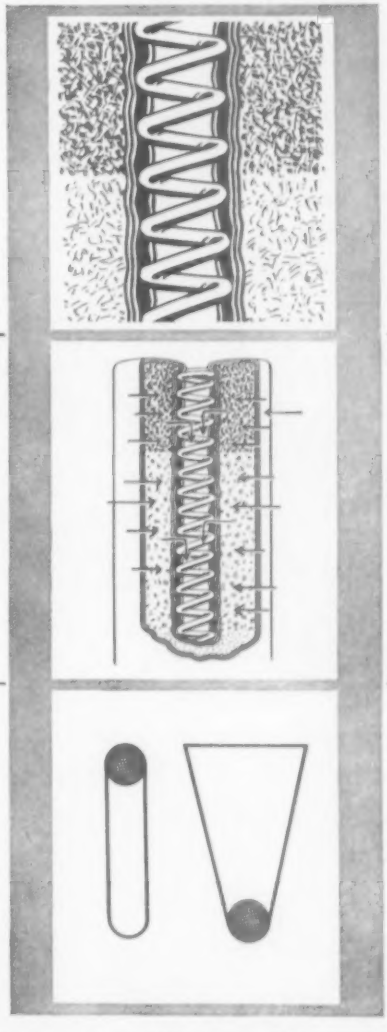
### THE PROBLEM

Complete engine protection at all times, filtering all the lube oil under either hot or cold oil conditions.



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An element with definite and predictable flow and pressure characteristics for various engine applications and requirements.

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An element that does not permit surface clogging with consequent reduction of efficiency and dirt holding capacity.

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# EQUIPMENT MEN . . . in the News

## Fisher Governor Moves Into New Research Center

**Fisher Governor Co., Marshalltown, Iowa, has moved into this recently completed research and engineering center. The new structure has 100,000 sq. ft. of space and covers approximately half a square block. The new facilities make possible better coordination and greatly expanded engineering and research activities. Performance tests can now be run of control equipment at pressures up to 2,500 psi., using air or water as flowing medium. The enlarged product-engineering department, sales engineering executive offices, and general-office departments are also in the new building.**

## Union Tank Announces Four Sales Department Changes

G. W. WILLIAMS

George W. Williams has been promoted to district manager of the state of Wyoming, and James E. Wren has been appointed sales representative at Casper, Wyo., for Union Tank & Supply Co., it has been announced by E. E. McDonald, regional manager, Great Bend, Kans. Also appointed as sales representatives at Nocona, Tex., and Ardmore, Okla., are Paul W. Alexander and Robert J. Garnett, it has been announced by A. F. Nixon, regional manager at Fort Worth.

Before assuming his new position, Williams was a sales and service representative in the state of Wyoming. Before joining Union Tank, Wren was a sales engineer with McCullough Tool Co. in Wyoming.

Prior to joining Union Tank, Alexander was with Luke Pontiac Co. at Arlington, Tex. Garnett was with Bradford Motor Works as a sales representative in the Great Bend, Kans., area before joining Union Tank.

## Gustin-Bacon Appoints Three to Sales Force

Gustin-Bacon recently announced the addition of three new men to its sales force. R. E. Van Winkle will handle sales in Michigan, northern Indiana and northwestern Ohio, replacing J. E. Rapp, who has been transferred to the home office at Kansas City. C. Barry Neill, Jr., has been assigned to the Atlantic sales area. He will handle sales in Alabama, western Tennessee, and western Georgia. J. A. Fairfield will be assigned to the Chicago sales district. His territory will include eastern Wisconsin, northwestern Illinois, and northeastern Iowa, formerly handled by George K. Leisenring, who has resigned.

Van Winkle was formerly associated with Alexander-Stafford Corp. at Grand Rapids. Neill, who was with William Powell Co. of Atlanta, replaces Clark M. Page, now the Kansas City district sales manager for Gustin-Bacon. Fairfield was formerly associated with Owens-Corning Fiberglas Corp.

## Bays Joins Staff of Geophysical Service

David S. Bays has joined the staff of Geophysical Service, Inc., as a seismologist specializing in marine oil exploration, GSI President Cecil H. Green has announced. Bays will work with the GSI motor vessel Sonic, a converted 400-ton naval craft. Currently, the Sonic is conducting marine seismic surveys in European waters.

Prior to joining GSI, Bays served as a party chief for another independent geophysical contractor. His experience includes 8 years of oil-exploration work in the United States and Canada.

## Axelson Makes Nave Head Of Northern California Area

L. T. NAVE

Lee T. Nave has been appointed area manager, northern California, and is to supervise district stores at Bakersfield, Coalinga, Orcutt, and Taft, according to an announcement by K. S. Ramey, petroleum equipment sales manager, Axelson Manufacturing Co.

Nave joined Axelson in the Long Beach store in 1935 and has been active in the California oil fields as well as in Central and South America where he has recently been in charge of export sales.

## Smith Men Meet at Louisiana-Gulf Coast Show

**The recent Louisiana-Gulf Coast Oil Exposition held at Lafayette, La., brought together the four H. C. Smith Oil Tool Co. representatives shown here. Left to right, they are: Cleve Holt, district sales engineer for East Texas and Louisiana; A. S. Marshall, general sales manager; C. Alton Prentice, Gulf Coast distributor of H. C. Smith rock bits and hole openers; and Harold H. Smith, assistant sales manager.**

HILLIARD

STEWART

BOULDIN

ARNOLD

RATLIFF

HUESTIS

POWELL

HEET

CLINKSCALES

SPURLOCK

WEST

CONINE

McANALLY

McIVER

# Mid-Continent Supply Expands Service

GARNER

JONES

SCHMID

SMITH

Mid-Continent Supply Co. Pres. Ken W. Davis recently announced personnel changes affecting several departments of the company. Promotions were announced in the purchasing, tubular, and sales departments.

The Farmington, N. M., store was placed under the direction of the Rocky Mountain division. The store formerly was a unit of the West Texas-New Mexico division.

P. Z. Hilliard was named general division manager. In this position he will coordinate operational activities of all Mid-Continent divisions. B. C. Stewart, replacing Hilliard as director of purchases, will supervise all purchasing. J. R. Bouldin has been named purchasing agent.

Those named to new positions include W. W. Arnold, Rocky Mountain division manager at Denver; L. T. Ratliff, division manager at Tulsa; and G. L. Huestis, division manager at Midland.

A change in structure of the tubular division of the company was announced, with two regional tubular managers named to assist Tubular Manager H. D. Powell and Assistant Tubular Manager M. F. Heet. S. R. Clinkscales has been named regional tubular manager for the Oklahoma-Kansas and Rocky Mountain divisions and the Amarillo area. He will continue to headquarter at Tulsa. F. J. Spurlock is new regional tubular manager for the Shreveport and Gulf Coast divisions, with headquarters in Houston.

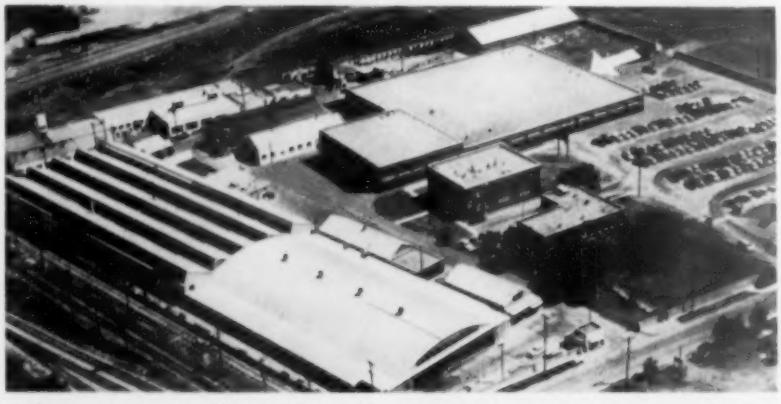
In Houston, W. I. West is now division sales manager for the Gulf Coast area; J. H. Conine bears the same title in Midland for the West Texas-New Mexico division. Division sales Manager R. L. McAnally of Farmington has been transferred to Denver.

In the Rocky Mountain area, District Manager C. D. McIver has been transferred to Sidney, Neb., from Casper, Wyo. Included in his district are Kimball, Sidney, Sterling, Fort Morgan, and Newcastle. O. G. Garner has been named district manager in Billings, Mont., where he will supervise Mid-Continent stores and sales locations in Casper, Rock Springs, Thermopolis, Vernal, Billings, and Williston.

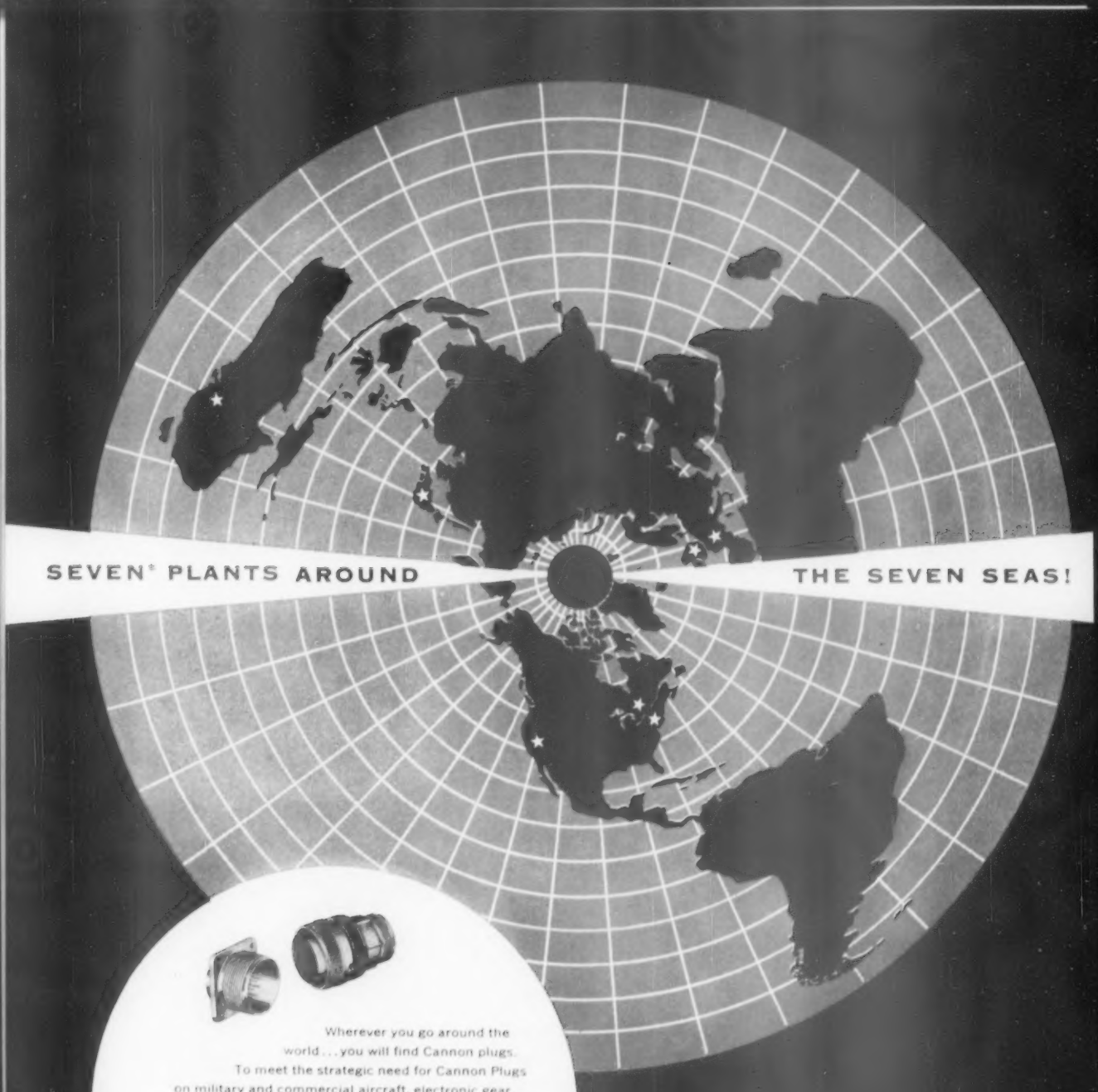
J. P. Jones has been promoted to district manager in charge of the Houston and Lake Charles stores, and W. W. Schmid was named district manager at Los Angeles. A. W. Smith recently took over new duties as store manager of the Houston store.

## Guiberson Starts Construction on New Plant

Start of construction on a large new oil-field equipment manufacturing plant building as well as further expansion of Guiberson Corp.'s rubber plant has been announced by Gordon G. Guiberson, president of Guiberson Corp., Dallas. Completion of the program will give Guiberson Corp. an increase in manufacturing-plant working area of more than 80 per cent and in rubber-



**Guiberson plants and office buildings with superimposed drawing of new manufacturing building, indicated by white arrow.**



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Wherever you go around the world . . . you will find Cannon plugs. To meet the strategic need for Cannon Plugs on military and commercial aircraft, electronic gear, radio and TV installations and countless other types of electrical equipment the world over, Cannon Electric has established overseas manufacturing facilities with leading electronic manufacturers for area markets outside the U.S.A. Cannon pioneered the multi contact electrical connector in the 1920's. Again Cannon is pioneering on an international scale as the largest exclusive connector manufacturer, with the widest variety of connectors available anywhere.

*With a group of 4 plants in the Los Angeles area, one in East Haven, Connecticut, one in Toronto, Canada, affiliates or licensees in London, Paris, Melbourne and Tokyo, Cannon actually has 10 plants; also, representatives in Cuba and Mexico.

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1 **Model AL** double drum draw works mounted on two trailers with 100,000-pound mast, makes ideal Slim Hole Rig to 4,000 feet.

2 **Model K-200** double drum hoist mounted on Model 152 "Trailermast" with separately powered rotary table. Well adapted for 7,000-foot Slim Hole Drilling.

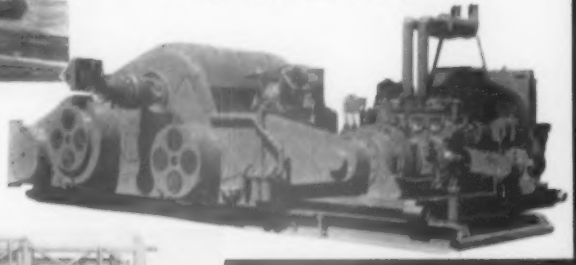
3 **Model AH** draw works mounted on Model 152 "Trailermast." Excellent for drilling to 4,000 feet.

# 7 NEEDS FOR ANY SLIM HOLE RIG

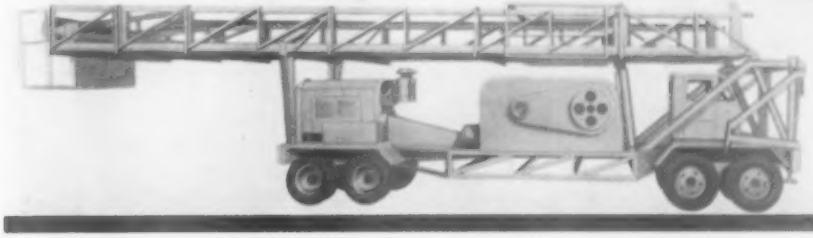
1. Requires a low capital investment.
2. Light weight reduces first cost and moving costs.
3. Arranged for fast rigging-up.
4. Capable of handling all drilling and completion operations efficiently.
5. Adaptable for a minimum crew.
6. Packaged into a convenient number of small-sized loads.
7. Lowers the daily operating costs.

**4** **Model L** single drum draw works mounted on Model 151 "Trailermast." Good for 7,000-foot Slim Hole Drilling.

**5** **Model S-350** draw works offers unexcelled big-rig performance and quality for 10,000-foot Slim Hole Drilling.



**6** **"Trailerig"** is a 10,000-foot, heavy-duty Slim Hole Rig, which is designed for fast moves. A completely packaged unit, giving ultimate flexibility with many built-in features.



**7** **Model M-250 "Travelrig"** is a self-propelled 7,000-foot Slim Hole Drilling Rig, incorporating latest improvements in rig and mast design, which cut daily rig costs.

## Cardwell Manufacturing Company, Inc.

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Long Distance Telephones 128 - 129 - 130

CARDWELL

Wichita, Kansas, U. S. A.
Cable Address: "ALL STEEL," Wichita—"CARDSTEEL," New York

plant working area of over 65 per cent, according to Alex P. Smith, vice president and general manager of the Dallas corporation.

The new single-story building will incorporate covered shipping dock facilities to accommodate 12 automotive trucks simultaneously. The increased floor space will provide working areas for modern production machines recently acquired.

Harry S. Zane, Jr., sales manager for Guiberson, stated that wide-spread acceptance of new products and steadily increasing demand for all Guiberson oil-field equipment and molded-rubber products made the expansion essential.

The entire expansion program now under construction, adjacent to the present Guiberson Corp. manufacturing facilities on their 29-acre plant site in Dallas, is scheduled for completion in the latter part of 1956.

## Lone Star Steel Co. Expands Sales Staff

Due to increased business and additional sales-promotion activities scheduled for the months ahead, Lone Star Steel Co. has expanded its sales staff. Walter T. Moreland, vice president, sales, announced that five members of the staff had been promoted.

Two new positions were created, with W. G. Whitsitt being named administrative assistant and R. L. Gibbins being named account executive. Both will work directly under Moreland.

Three positions, previously appearing in the company's organization chart but not heretofore filled, resulted in promotions for B. C. Robertson, Don Weekes, and R. R. Hirsch. Robertson was promoted from Houston district manager to manager, oil-country goods sales. Weekes and Hirsch, formerly assigned to the general office sales staff, were named manager, line-pipe sales, and manager, order scheduling department, respectively.

As a result of Robertson's promotion, the vacancy in the Houston district office would be filled by Tom Pearson, who was named manager.

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## Leland Equipment Ships 15 Trucks to India

**The Leland Equipment Co. of Tulsa this week completed delivery on 15 Leland-built truck bodies being routed to India under the United States' International Cooperation Aid Program. The Rocky Mountain Export Co. of Denver placed the order with Leland approximately a month ago. The 15 RDF-190-A International tandem chassis were driven from International's plant in Fort Wayne to Tulsa for body fabrication. The body design is the Leland packaged-unit oil-field truck body, a flat-bed body equipped with gin poles and a Model 23, 18,000-lb.-capacity behind-the-cab winch. Each unit also carries a heavy-duty headache rack with spare tire carrier; rolling tail board; steel tool box; snatch block; ICC lights and reflectors; winch mounting brackets; tail chains, load chains, and wire line.**

## Oilwell Makes Field Changes in Two Areas

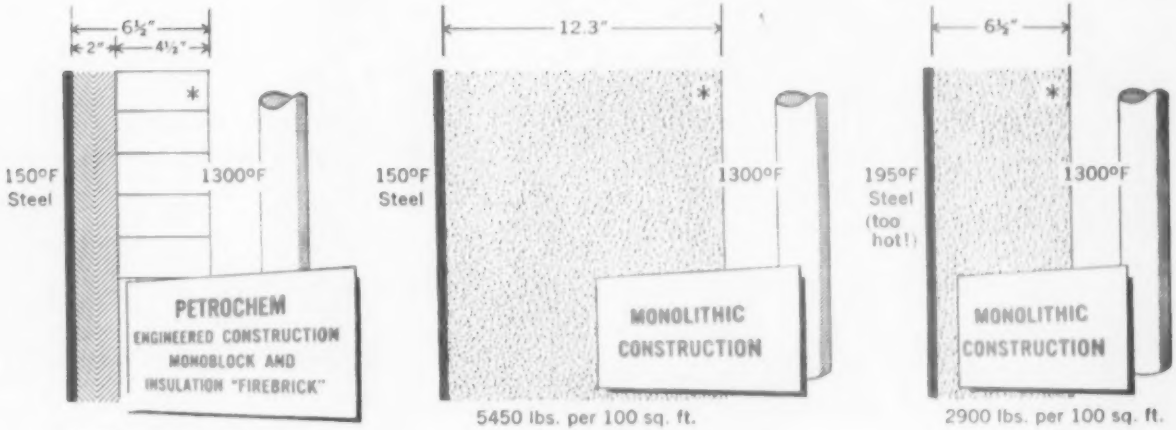
Several appointments and transfers have been announced by C. H. Maynard, eastern area manager, and William Miskimins, Central Midwest area manager of U. S. Steel's Oil Well Supply Division.

In the eastern area, a new store has been opened at Beattyville, Ky.; Richard A. Bokenkamp has been appointed store manager at Charleston, W. Va.; Byron C. Hoffman has become store manager of the Grandville, Mich.,

# In furnaces as in processes compare the design to judge the advantages

As an example:

The wall construction of all Petrochem-Isoflow Furnaces is designed for 150°F maximum outside shell temperature.




*Based on B & W values.

The Petro-Chem design provides a thoroughly engineered wall construction. It is built with two tiers of monoblock supported on 18 inch centers and a circular arched wall of insulating firebrick. The inside of the steel shell is protected from the possibility of corrosion by a one-eighth inch thickness of Staylastic cement. This type of construction, independently supported monoblock and the circular arch of firebrick, bonded with Smoothset mortar, assures optimum efficiency and minimum maintenance.

The use of monoblock and insulating firebrick laid as a circular arch provides many advantages over a one-piece monolithic lining, including:

*1—Low weight, 2—Low heat conductivity, 3—High hot crushing strength, 4—Low expansion coefficient, 5—Resilient compressible backing, 6—Long life, 7—Nil maintenance.*

Also, this construction has low heat storage capacity, speeds both heating and cooling. Its light weight requires less concrete foundations and steel supports.

Compare and your judgment will affirm
Petrochem-Isoflow Furnaces are Most Efficient by any Comparison

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store; and Ivan R. Blauser, Jr., assistant district engineer, has been transferred to the new Beattyville store.

In the Central Midwest area, Milton A. Grappe has been appointed store manager at Pampa, Tex. Bobby Gene McDonald and Eddie L. Hatfield have been named field representatives at Hobbs, N. M., and Borger, Tex. Joseph R. Nye and Joseph M. Rogers, field representatives, have been transferred from Gainesville, Tex., to Sherman, Tex.

James A. Durham will be manager of the store at Beattyville. He joined Oilwell in 1941, became manager of the Charleston store in 1950, and in 1953 was appointed district representative at that location.

Bokenkamp was employed in 1948 and in 1953 became store manager at Grandville. Hoffman, who joined Oilwell in 1935, became district representative at Grandville in 1953. Blauser was employed by the division as an engineer trainee in 1953 and became assistant district engineer at Parkersburg, W. Va., in 1955.

Grappe joined Oilwell in 1947 at Borger and served as field representative at Albany and Borger, Tex. McDonald came to Oilwell in 1955 at Odessa, Tex., where he was located prior to his present appointment. Hatfield and Nye joined Oilwell at Wichita Falls, Tex., in 1953 and 1948. Rogers joined Oilwell in 1946 at Odessa and became field representative at Gainesville in April 1955.

## Failing Names Baker to Head New Denver Office

The George E. Failing Co., of Enid, Okla., manufacturers of portable drilling rigs, has opened a sales office in Denver, Colo., with Clyde E. Baker in charge. Previously, Baker has served Failing as field engineer at Houston and branch manager at Hattiesburg, Miss., and Los Angeles, Calif. In addition to the Denver office, Failing has supply stores at Casper, Wyo., and Grand Junction, Colo.

## Baash-Ross Announces Three Sales Promotions

R. C. BRENNER

The promotion of R. C. Brenner to sales manager for the Rocky Mountain area of Baash-Ross Tool Co., division of Joy Manufacturing Co., has been announced by Hal Messinger, general sales manager. Gordon Morrison has been promoted to sales manager for the company's operations in the Canadian area. The appointment of Herb Klepfer as export sales manager for the company has also been announced.

G. MORRISON

HERB KLEPFER

Brenner formerly was with Monarch Logging Co. of San Antonio as party chief. From Monarch he joined Baash-Ross as sales representative. He will operate out of offices in Denver.

After 18 years' drilling experience, which began in Turner Valley and extended throughout the western provinces, Morrison served in a supervisory capacity with Commonwealth Drilling Co., Ltd., and Pacific Petroleum, Ltd., before joining Baash-Ross as a sales

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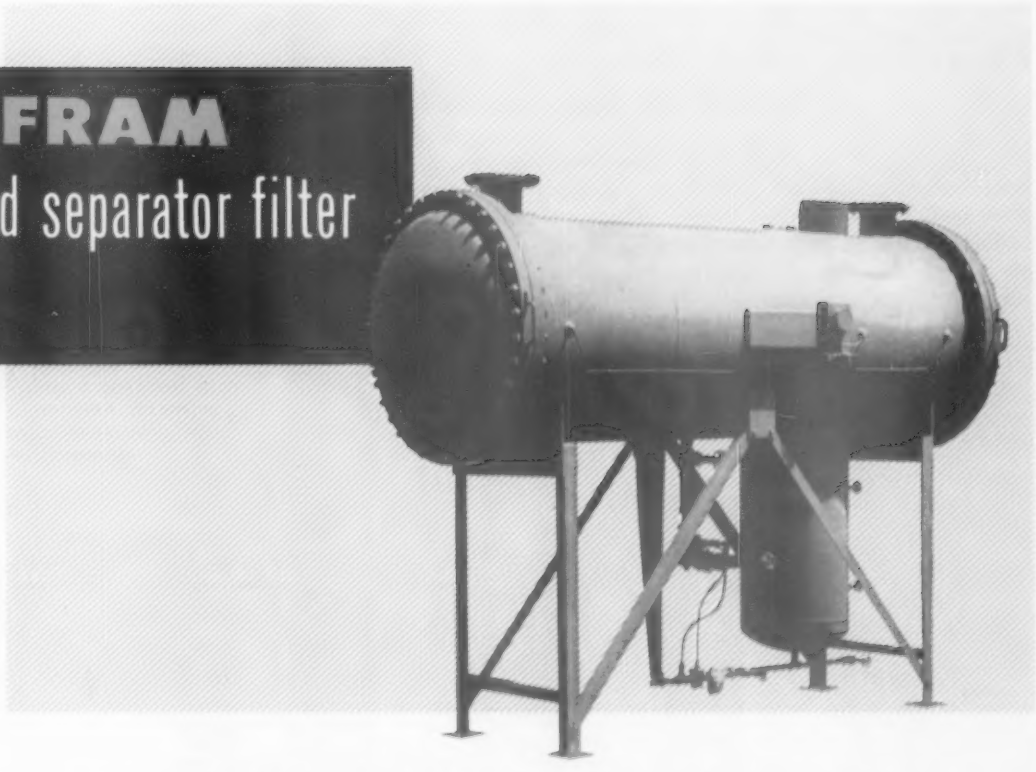
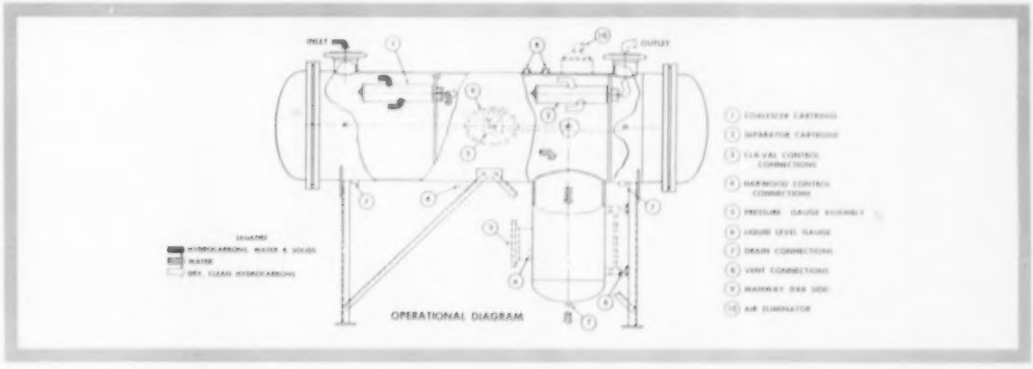


**Removes the water cloud and solids from light petroleum products.**




Here is the sure way to obtain clean, water-free petroleum products — the FRAM Liquid Separator/Filter is designed for use in refinery process streams and petroleum marketing installations to remove entrained water and solids (down to 5 microns) from gasoline, jet fuel, diesel fuel, kerosene, burning oils. Capacity is from 5 to 1000 GPM. Built to API-ASME Code. Send for Bulletin.

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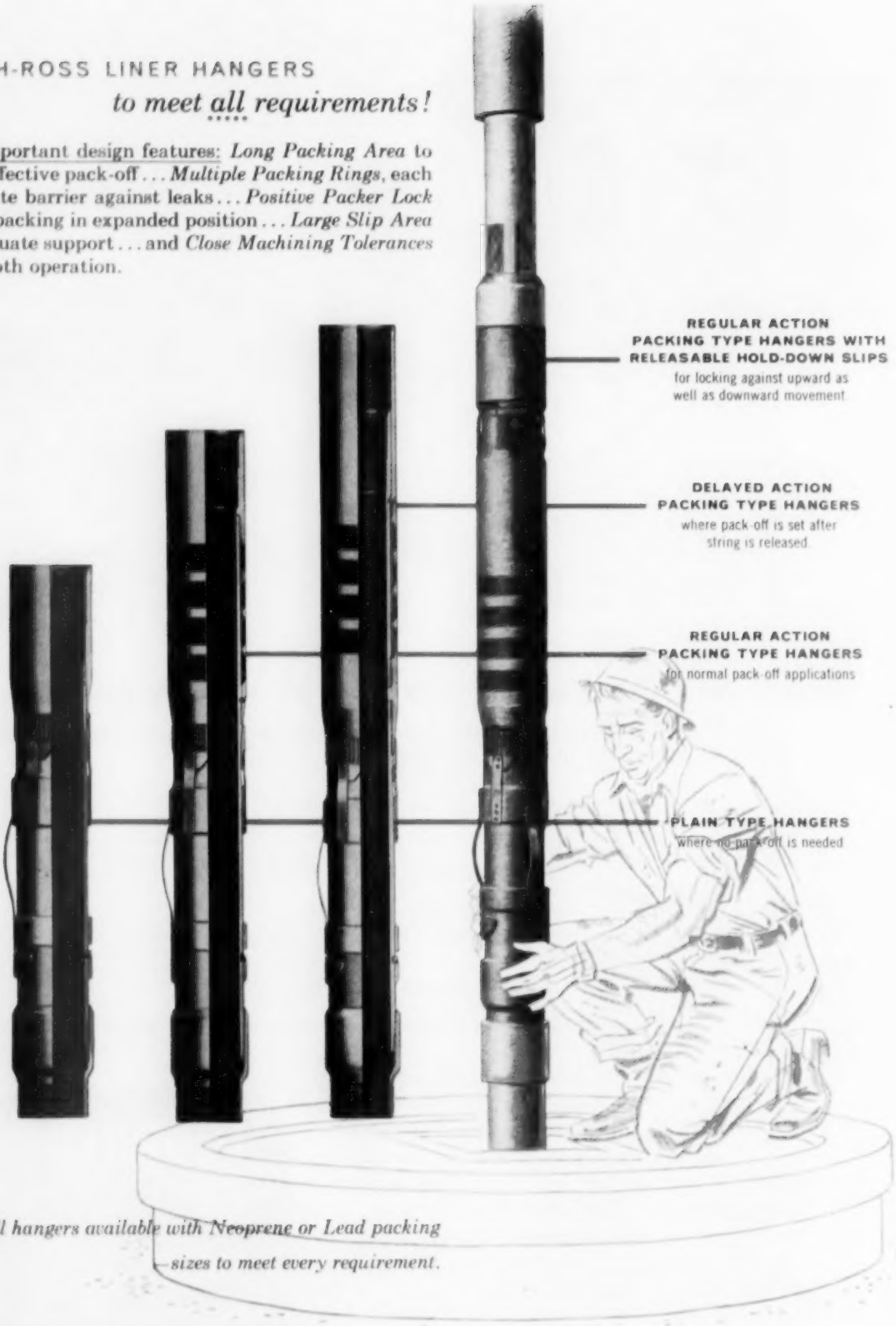
*to meet all requirements!*

Note important design features: *Long Packing Area* to insure effective pack-off . . . *Multiple Packing Rings*, each a separate barrier against leaks . . . *Positive Packer Lock* to hold packing in expanded position . . . *Large Slip Area* for adequate support . . . and *Close Machining Tolerances* for smooth operation.




*All hangers available with Neoprene or Lead packing*

*—sizes to meet every requirement.*

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DIVISION OF JOY MANUFACTURING COMPANY

*Los Angeles, Calif. • Houston, Texas • Odessa, Texas • Oklahoma City, Okla. • Casper, Wyo. • Olney, Ill. • Edmonton, Alb., Canada • New York City*

representative. He will headquarter in the Baash-Ross offices at Edmonton, Alta.

Klepfer was formerly with Shell Chemical Co. From Shell he went to Sunray Oil Co. and then to Baash-Ross as sales representative in the San Joaquin Valley area. His recent promotion takes him to New York where he will head the Baash-Ross export sales offices.

## Four Key Sales Changes Made by Rockwell Division

Four key sales personnel changes at national headquarters of Rockwell Manufacturing Co.'s Meter & Valve Division have been announced by Lloyd A. Dixon, Jr., vice president.

Jack H. Walters, gas-products manager for the past year, has been named

J. H. WALTERS

KITZMILLER

manager of gasoline and oil products. Robert B. Kitzmiller, San Francisco district sales manager since 1952, has been named gas-products manager. T. O. Carson, assistant products manager, Nordstrom valves, has assumed

T. O. CARSON

M. F. GROOM

the additional responsibility of manager of distributor sales. M. F. Groom, a sales engineer from the Houston, Tex., district, has been named assistant manager of distributor sales. All four will make their headquarters in Pittsburgh.

Walters joined Rockwell in 1945 as a sales engineer in Louisiana. He became Houston district gas-products supervisor in 1948 and Houston district sales manager in 1951.

Kitzmiller joined Rockwell in 1934 as a production clerk, moved to the Pacific Northwest as a sales engineer in 1945, became San Francisco branch sales office manager in 1951.

Carson was employed by Rockwell's International Division as a sales engineer in 1945 and managed the division from 1949 to 1954. Groom joined the company in 1946 as a sales engineer in New Orleans.

## McEvoy Names Krause as Houston Sales Engineer

McEvoy Co., Houston, has announced the appointment of William Krause, Jr., as sales and service engineer serving Houston and the surrounding area.

Krause is thoroughly acquainted with the oil-field industry, having come to McEvoy Co. from another oil-tool firm. His headquarters will be in Houston, where he will be serving the Gulf Coast oil companies with problems pertaining to high-pressure valves and well-head equipment.

## O.C.T. Offers Rights to Use Dual Completion Units

John Maher, president of Oil Center Tool Co., Houston, has announced that the company is offering manufacturing rights for dual-completion wellhead equipment under its patent No. 2,335,355 to all valve and wellhead equip-


YOU JUST CAN'T BEAT

SLIP-ON'S*!

You can accomplish maximum economy by using Enardo **SLIP-ON** fittings for all low pressure fitting installations. Some users have reported a 50% savings in time and money because of their labor saving qualities. No unions are needed with Enardo **SLIP-ON** fittings, which means easier, faster, and cheaper lease installations.

Consult your Enardo salesman or call the Tulsa office for your own particular fitting needs.

4" to 3" and 4" to 2" **SLIP-ON** 45° reducer ells. Principally designed for use in equalizer line installations.

4" N.P.T. to 3" **SLIP-ON** reducer connections. For connections between screwed end pipe and blank end pipe. Also used for water-leg installations.

6" to 4" **SLIP-ON** 90° reducer ell. General purpose fitting for installations where working pressures do not exceed 150 p.s.i.

*Reg. T. M.

ENARDO manufacturing company

BOX 1647 • TULSA, OKLAHOMA

ment manufacturers on a nonroyalty basis. This patent represents one of the earliest engineering advances relating to dual-completion methods and procedures.

Maher stated that O-C-T is offering these manufacturing rights because the company believes that the oil industry is entitled to the full benefits of dual-completion equipment and that oil operators should be at complete liberty to specify the valves and other component equipment of their choice used in this type assembly without paying a royalty bonus.

## Cox Named to Tulsa Area By Hercules Tool Co.

Walter H. Cox of Tulsa has taken over duties as city sales representative for central and northeastern Oklahoma for Hercules Tool Co., S. P. Tschappat, president of the firm, has announced. Cox is filling a newly created post in the company. He will call on oil companies and supply companies in Tulsa, Oklahoma City, Ponca City, and Bartlesville.

Cox moved to Tulsa from Wichita, Kans., in 1953. He started his sales career in Parkersburg, W. Va., with Oil Well Supply Co., remaining with them 17 years. He also has worked with an eastern branch of Lee C. Moore Co. and more recently with Union Tank & Supply Co.

OILCO
Loading four or more compartments simultaneously with Spring-Matic Model 450-A, without re-spotting transports.
THE SPRING-MATIC DOES ALL THAT YOU WANT A LOADER TO DO!
The Oilco Spring-Matic performs to perfection for petroleum marketers everywhere—and enjoys world-wide acceptance.
This dependable loader represents the peak effort of 25 years of collaboration with the foremost engineers in the petroleum industry. Based on hydraulic and cam principles, it is flexible, yet sturdy, and is so perfectly balanced the assembly returns to semi-vertical position at the touch of a finger. It has other unsurpassed assets insuring ease of handling, economy, trouble-free operation and complete satisfaction. Write now for detailed description.
MODEL No. 440
SIZE: 3" AND 4"
OIL EQUIPMENT MANUFACTURING CO.
INCORPORATED
3100 VERMONT AVE., LOUISVILLE 11, KY.


## Alco Names Power Machinery As Exchanger Distributors

Appointment of Power Machinery Co. agents for its new Alcotwin line of finned-tube heat exchangers has been announced by Alco Products, Inc. Under the terms of the agreement,

WIEGHARD

W. T. STEWART

Power Machinery will be the exclusive agents for the new equipment in Kansas, Oklahoma, Texas, and Louisiana.

In a joint statement, E. N. Sieder, Alco's marketing manager for thermal products, and H. C. Wieghard, president of Power Machinery Co., said that the addition of the Alcotwin to the Alco line of conventional shell and tube equipment will enable PMC to offer a complete line of heat-transfer products for every process requirement in the Southwest.

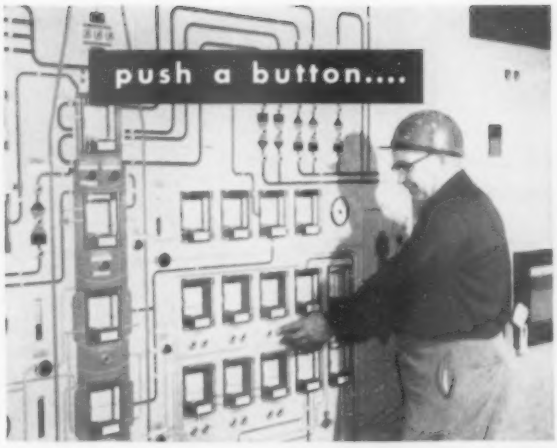
R. HENRY

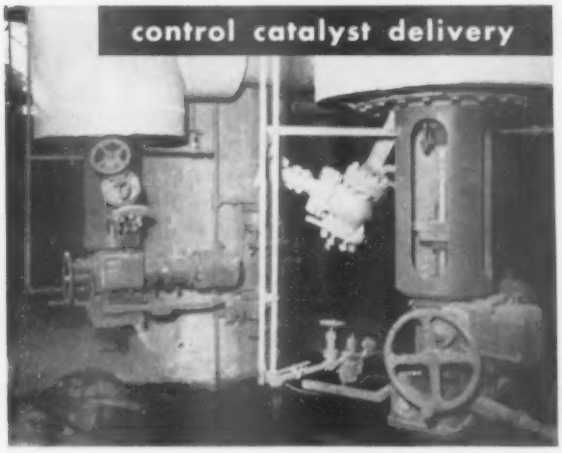
C. E. SHOCKEY

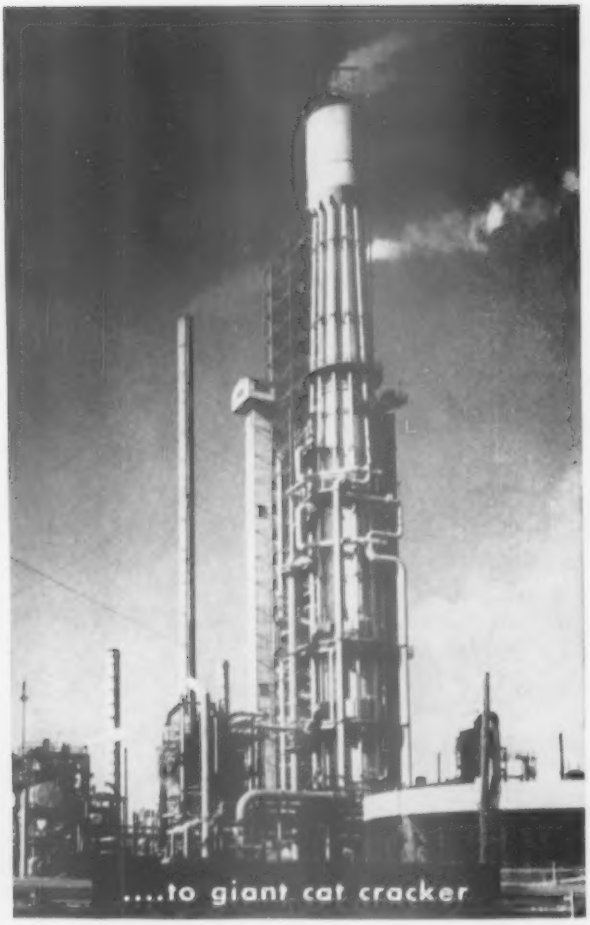
Other PMC personnel concerned with the new sales agreement include: W. T. Stewart, manager of heat-exchanger products; Richard Henry, manager of the company's Houston office; and C. E. Shockey, Kansas City manager.

Prior to joining PMC in 1943, Wieghard worked for Worthington Corp. and later was employed by Lummus Co. W. T. Stewart worked for Engineers & Fabricators until entering the Navy in 1942. He joined Power Machinery immediately after his discharge in 1945.

Henry worked for The Texas Co. and M. W. Kellogg Co. before joining PMC




# Limitorque® Valve Controls Maintain Constant Catalyst Flow in Sun Oil's New Houdriflow Unit at Marcus Hook

To process more than 50,000 gallons of hot oil, 700 tons of cracking catalyst is delivered per hour to the top of this 350 ft. reactor. Limitorque valve operators open and close specially designed mixer valves, maintaining uniform flow of the air-blown catalyst through 12 pneumatic lift pipes. The Limitorque units are actuated by remote, push-button controls at a central control room panel.

Accurate regulation of catalyst flow is vital to the catalytic cracking process. Limitorque valve controllers are handling the job efficiently and effortlessly.

Limitorque motor-operated valve controllers may be actuated either remotely or manually, to open and close all types of valves. They are readily adapted to microwave control. Wherever valve operation is important . . . look to Limitorque.

Send for illustrated 30-page catalog, L-550, describing Limitorque automatic valve controllers and components.

**PHILADELPHIA GEAR WORKS, INC.**

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NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
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LimiTorque Corporation—Philadelphia

Industrial Gears & Speed Reducers

LimiTorque Valve Controls

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Write or Wire
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● VALVES
● PRESSURE TUBING
● STEEL

Peerless Supply Co., Inc.
L. D. 75 & 76 P. O. Drawer 36 A
Shreveport, La.

VICTOR ALLOY STUDS

VICTOR PRODUCTS CORP.
2635 W. BELMONT AVE. • CHICAGO 18, ILL.

in 1949. Shockey was employed by Byron-Jackson Co. in 1950 and joined PMC in 1952 to open the firm's Kansas City office.

## Armour Names LaSusa to Head Southern Region

C. D. LaSUSA

C. D. LaSusa, formerly specialist in sales of Armour & Co.'s chemicals used by the petroleum industry, has been named manager of the Chemical Division's newly established southern region, J. M. Hoerner, division general manager, announced.

LaSusa joined Armour in Chicago as a chemical salesman in 1950. He was transferred to St. Louis for a time before returning to Chicago where he will be headquartered in his new post.

During the past year the division has established sales territories at Houston and Tulsa and expects to open two more territories in the near future. These will be supervised by LaSusa.

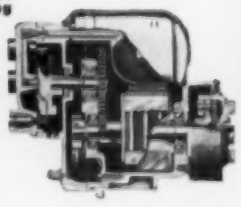
CONTINUOUS PUMPING ENGINE OPERATION DAY AFTER DAY

Change the present magnetos on your pumping engines to Fairbanks-Morse Super Spark Magnetos and eliminate costly ignition failures. Fairbanks-Morse Magnetos are tops in economical performance and dependability—proven by years of severe oil field service—built by Fairbanks, Morse & Co., manufacturers of superior products for over 120 years.

Switch to Fairbanks-Morse Super Spark Magnetos and forget about ignition failures. See your Fairbanks-Morse service station or distributor or write Fairbanks, Morse & Co., Magneto Division, Beloit, Wisconsin.

BUILT TO TAKE A BEATING

- Compact, rugged, self-contained unit—few working parts
- Sturdy impulse coupling of simple design for easy starting
- Alnico Super Magnets cast into powerful one-piece magnetic rotor
- Steady hot spark at all speeds
- Large, long lasting breaker points for quick starts—smooth performance
- Oversize high tension coils—built to take a beating



This is type FM-XOR six cylinder magneto with ball bearings throughout—available in base or flange mounting.

FAIRBANKS-MORSE
a name worth remembering when you want the best

MOTORS • ZC ENGINES • MAGNETOS • PUMPS • DIESELS

## Vinson Supply Opens New Store at Farmington

**J. M. McReynolds, president, and B. E. Keeling, vice president in charge of West Texas and New Mexico operations, have announced the completion and opening for business of this Vinson Supply Co.'s new store at Farmington, N. M. The Farmington store gives Vinson its fifth large warehouse facility. The Farmington store provides office and warehouse space in excess of 10,000 ft. Lynne Witherspoon is manager of the new store. Previously, Witherspoon, who has been in the supply business 8 years, was in Vinson's Odessa store.**

## National Supply Promotes Carter to Division Post

Jay G. Carter, district manager for National Supply Co. in Kansas, has been promoted to assistant division sales manager for the Midwest division. He will continue to make his headquarters in Wichita, directing sales activities in that area.

Carter joined the company in 1918 as a clerk in the store at El Dorado, Kans., and was advanced to store manager, assistant district manager, and has served as district manager since 1929.

## Magcobar Makes McBrien Vice President in Canada

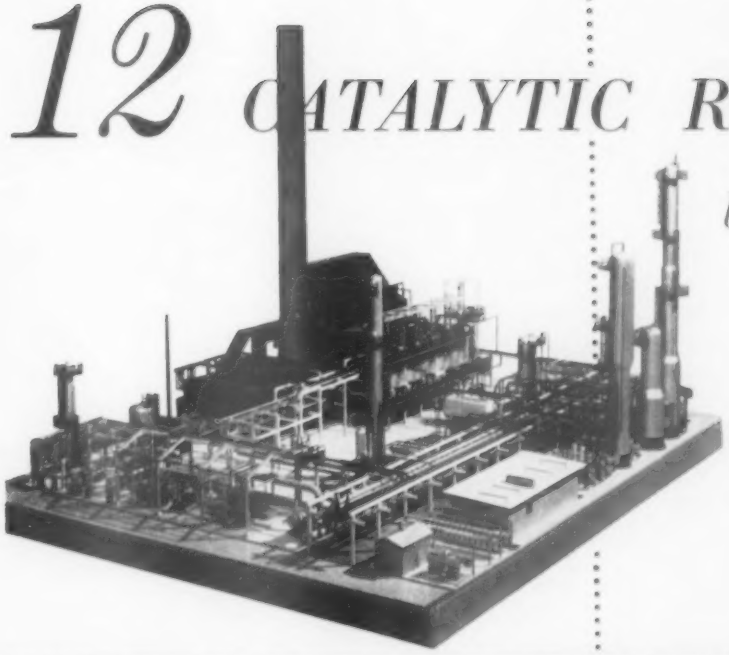
W. W. McBRIEN

Wesley W. McBrien has been named vice president for Canadian operations of Magnet Cove Barium Corp., Willard M. Johnson, president of the Houston drilling-mud firm, has announced. McBrien, a native of Toronto, Canada, was the former vice president and general manager of Canadian Industrial Minerals, Ltd., a barite mining company purchased by Magcobar on November 1.

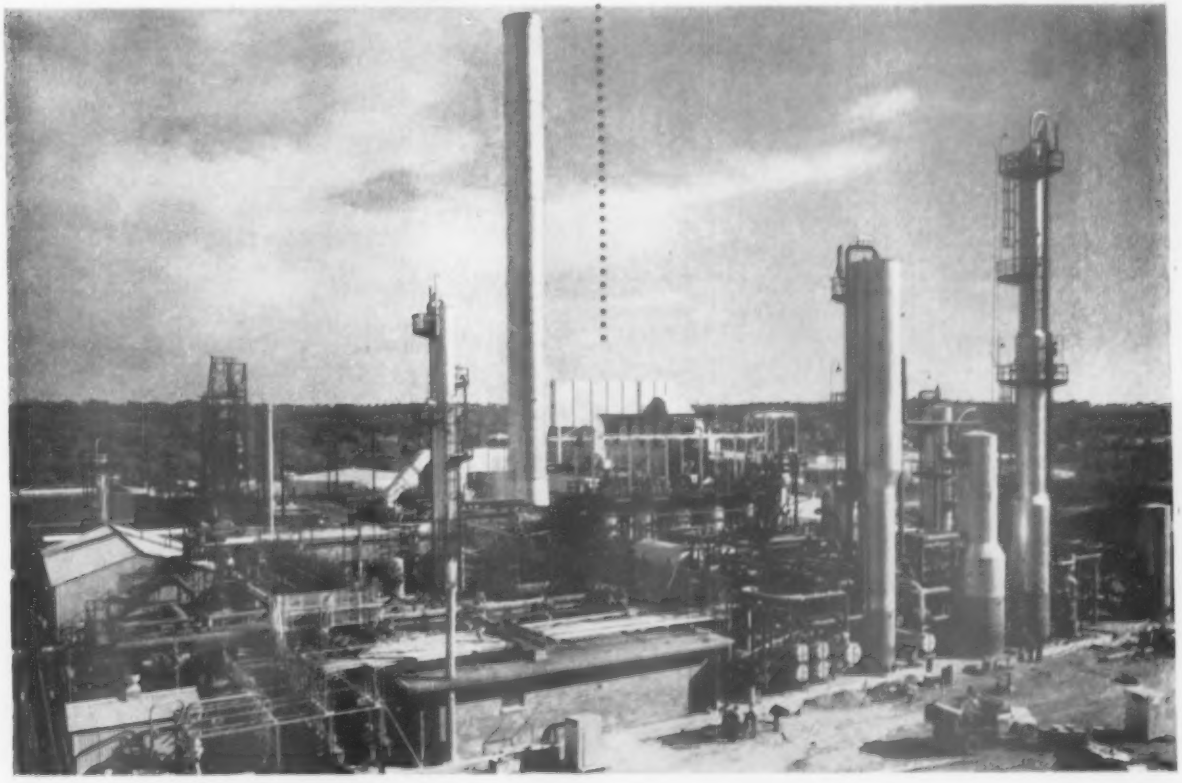
With the purchase of Canadian Industrial Minerals, Magnet Cove ac-

# 12 CATALYTIC REFORMERS

*by* **PARSONS**



**Contracts for twelve catalytic reformers have been awarded to Parsons. These plants range in capacity from 600 to 17,000 barrels per day and include regenerative and non-regenerative units using four different platinum-type catalysts. Process design, engineering, procurement, and construction of these catalytic reformers are by Parsons.**



**THE RALPH M. PARSONS COMPANY**

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# Discuss your DESALTING problems with an EXPERT

Trained, experienced engineers from Humble's Technical Service Division are at your service. A letter, telegram or telephone call will bring one of them to your refinery for a study of your desalting problem and a specific recommendation for its solution.

Humble's Breaxit Desalting Chemicals are outstanding . . . the result of years of specialized study and experimentation by a company that has problems similar to your own.

*Specifically, Breaxit Desalting Chemicals:*

**Help you get maximum refinery runs . . .**
**Save you money by increasing output and efficiency . . .**
**Extend equipment life . . .**
**Make for safer operation.**

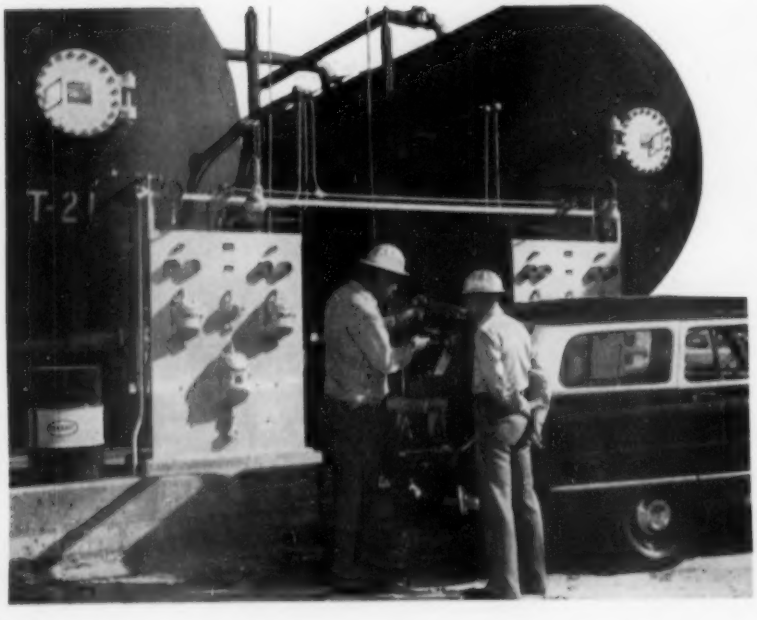
# Breaxit

DESALTING CHEMICALS

Manufactured and sold by:

HUMBLE OIL & REFINING COMPANY

HUMBLE





quires one of the largest barite mines in the Western Hemisphere. The mine is located in the Canadian province of Nova Scotia and is known to contain several million tons of barite.

Present plans call for the crude barite from Nova Scotia to be shipped to Magcobar's plants at New Orleans and Lake Charles, La., and Brownsville, Tex., for processing and sacking. Production capacities of these mills have been doubled to accommodate imported ore. In order to process its large supplies of barite, Magcobar also has opened a mill at Battle Mountain, Nev.

## Walker Made Supervisor For National Geophysical

J. Ryan Walker has been named supervisor for National Geophysical Co. of Dallas and will make his headquarters in Shreveport, La.

Prior to joining National Geophysical, Walker was chief geophysicist for Arkansas Fuel Oil Corp. at Shreveport.

## Jones & Laughlin Steel Moves Gibson to New Post

Joe B. Gibson, of Library, Pa., has been appointed special representative, line pipe projects, in the Tubular Products Division of Jones & Laughlin Steel Corp.

From 1949 until his present appointment, Gibson was employed by Jones & Laughlin Supply Division in various capacities. In November 1949 he became a storeman in Shreveport, La.; in June 1951 he was appointed store manager in Haynesville, La.; in December 1953 he was named field salesman, El Dorado, Ark.; and in February 1954 he became sales office manager in Chicago.

## United Supply Opens New Store at Lindsay

**United Supply & Manufacturing Co., Tulsa, recently opened a new supply store at Lindsay, Okla., celebrating the occasion with a barbecue attended by over 1,000 drilling and production men. W. H. (Dub) Welsh is manager of United's newest oil-field supply store.**

## OFFSHORE DRILLERS:

# RAYFLO Resists Salt Contamination . . . Cuts Your Drilling Mud Costs!

Rayflo answers the need for a drilling mud additive that *controls* the properties of a sea water mud. By using Rayflo, offshore drillers can use sea water in drilling mud preparation, cut costs tremendously since transportation of large quantities of fresh water to the drilling site is unnecessary. For proof of performance, take a look at the example below.

Comparison of Rayflo, Lignite, and Quebracho in Sea Water Muds

| | Viscosity cps. | Plastic Viscosity | Yield Point | Gel Strength Initial | Gel Strength 10 min. | Fluid Loss | Filter Cake | pH |
|---|---|---|---|---|---|---|---|---|
| Test 1. Base Mud | 45 | 16 | 60 | 45 | 45 | 27.6 | 6 | 8.3 |
| Test 2. 3 lbs. Quebracho 1.5 lbs. Caustic | 27.5 | 10 | 35 | 17 | 25 | 26.6 | 5 | 10.1 |
| Test 3. 3 lbs. Rayflo 1.5 lbs. Caustic | 15 | 8 | 14 | 1 | 13 | 24.8 | 5 | 10.6 |
| Test 4. 3 lbs. Solubilized Lignite 1.5 lbs. Caustic | 37.5 | 10 | 55 | 30 | 30 | 27.2 | 5 | 11.3 |

Base mud made up with 40 lbs. Texas Bentonite 60 lbs. ground Shale in Galveston sea water containing 34,300 ppm Nacl, 1,933 ppm Calcium 1,600 ppm sulfates

**RAYFLO IS A NEW SILVICHEMICAL** made to rigid and consistent standards. It is a dark reddish brown powder—made from the bark of the Western Hemlock Tree. Made by Rayonier Incorporated, one of the world's leading producers of chemical cellulose for a broad variety of industrial uses. Prepared under strict technical control, Rayflo offers 6 *important advantages:*

**WATER SOLUBLE**—No need to dissolve it in caustic soda.

**COMPLETELY EFFECTIVE**—Even under conditions of low alkalinity.

**RESISTS CONTAMINATION**—by salt, gypsum, cement.

**UNIFORM**—Every batch is consistent—one bag is just like another.

**STABILIZES**—Rayflo is an excellent oil emulsion stabilizer.

**DOMESTIC PRODUCT**—Rayflo is not subject to the uncertainties of foreign conditions.

Rayflo is available at your drilling mud service company; if you wish a sample of Rayflo, write to Rayonier Incorporated, 161 East 42nd St., New York 17, N. Y.

*RAYFLO is the registered trade mark of Rayonier Incorporated.*

RAYONIER INCORPORATED

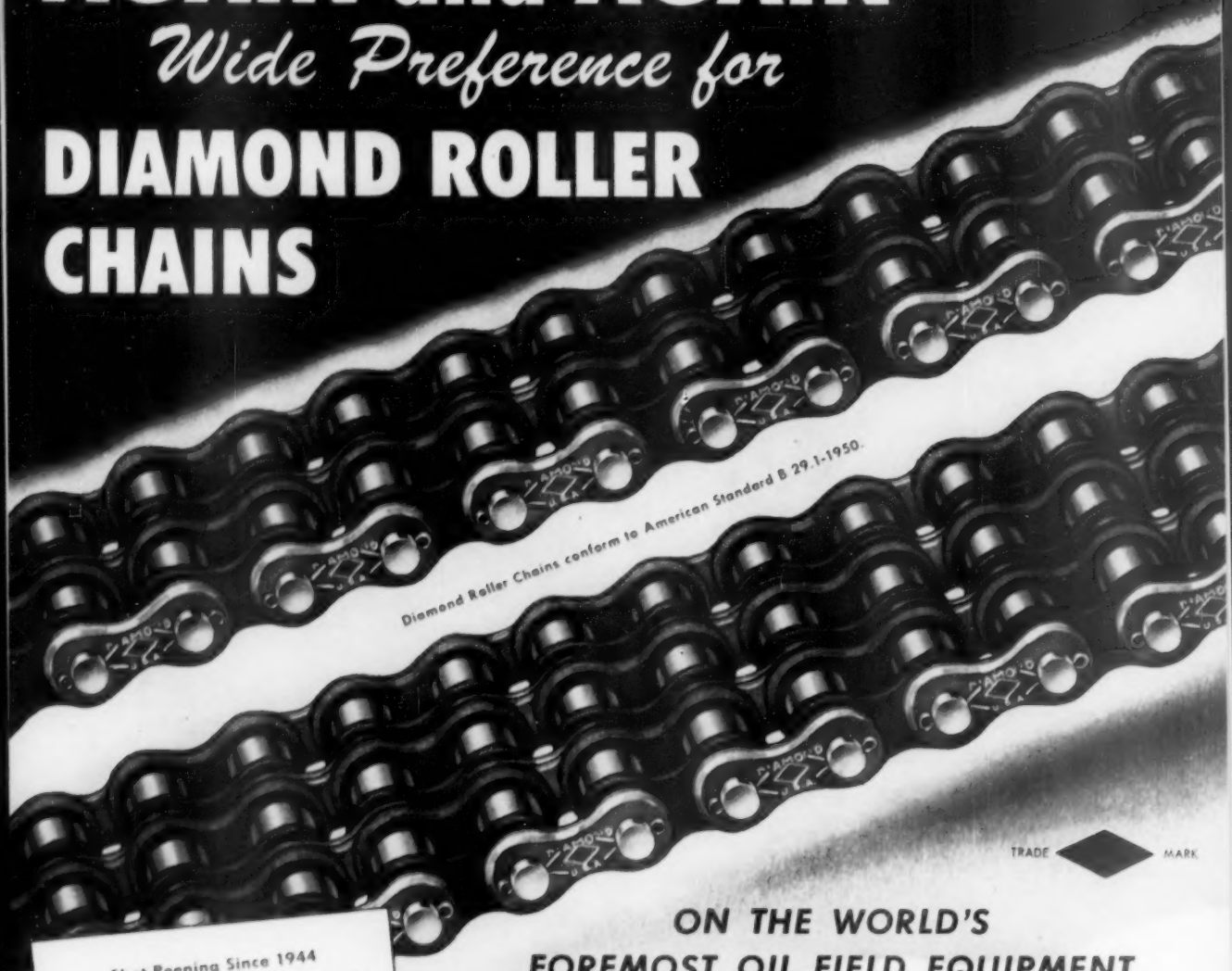
*cellulose chemistry*

Executive and General Sales Offices: 161 East 42nd Street, New York 17, N. Y.

# AGAIN and AGAIN

## *Wide Preference for*

# DIAMOND ROLLER CHAINS




### Shot-Peening Since 1944

To increase the fatigue resistance of Diamond Chains, link plates have been specially processed, and chain rollers and other parts have been shot-peened since 1944.

### Patented BCL Connector

The patented, bushed-centered-plate BCL connector for multiple-strand press-fit center-plate chain has simplified connecting and disconnecting, and assures full value in Diamond Chains at the connecting links.

### Press-Fit Center-Plate Construction of Multiple-Strand Roller Chain

Diamond's press-fit center-plate construction of multiple-strand chains provides equal distribution of loading across the chain width—throughout the entire, longer service life. Also available with slip-fit Center Plate Construction for Supply Store Replacement Stocks.

### Rigidity of Link Construction

Special finishing of link plate pitch holes, providing 100% contact of pins and bushings in their respective link plates, considerably enhances the uniform and substantial press-fitting of these parts, assuring maximum rigidity of link construction.

## *ON THE WORLD'S FOREMOST OIL FIELD EQUIPMENT*

### *DRILLING • PUMPING • SERVICING RIGS*

• The long-life performance, the extra reserve strength—the uniformity of high quality in every foot of Diamond Roller Chain have resulted in their wide preference by the recognized leading manufacturers of oil country equipment.

Experienced production men operating these rigs all over the world have proof again and again that there is no substitute for Diamond quality and dependability.

**DIAMOND CHAIN COMPANY, INC.**

*Where High Quality is Traditional*

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***Offices and Distributors in All Principal Cities***

*Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER*

DIAMOND ROLLER CHAINS

TINY DERRICKS no bigger than a match . . .

AND DIORAMAS built to scale . . .

# Oil Geology in One Easy Looking

**by Frank J. Gardner**

THE recent opening of the American Museum of Natural History's Hall of Oil Geology was a dramatic addition to the biography of oil. It is the largest and most complete exhibit ever constructed for our industry, and will strike a telling blow in our fight for more complete understanding of that industry by the general public.

Every display in the hall is designed to explain to the layman how nature creates, distributes, and stores oil; how the team work of the geologist, geophysicist, paleontologist, and associated scientists results in its discovery underground; how the drilling rig and crew operate to tap the reservoir; and how oil and its many derivatives have benefited mankind.

It's all very realistic; the dioramas, models, and maps are strictly to scale. There's even a tape recording played to heighten the realism of the model drilling rig; as you look it over, you listen to the sound of grating, churning rock bits and the gurgling of the mud in the pit. Roughnecks and drillers 10½ in. high man the drilling operation. A model derrick 25 ft. high reaches to the ceiling of the hall and the draw works, engine, mud pumps, work lights, and rotary tables are built to precisely one-sixth actual size.

Three-dimension models and dioramas, charts, and maps demonstrate how oil was formed, how it was trapped, and where it is found today. A series of five colorful maps shows the geological changes in North America over the past 500 million years.

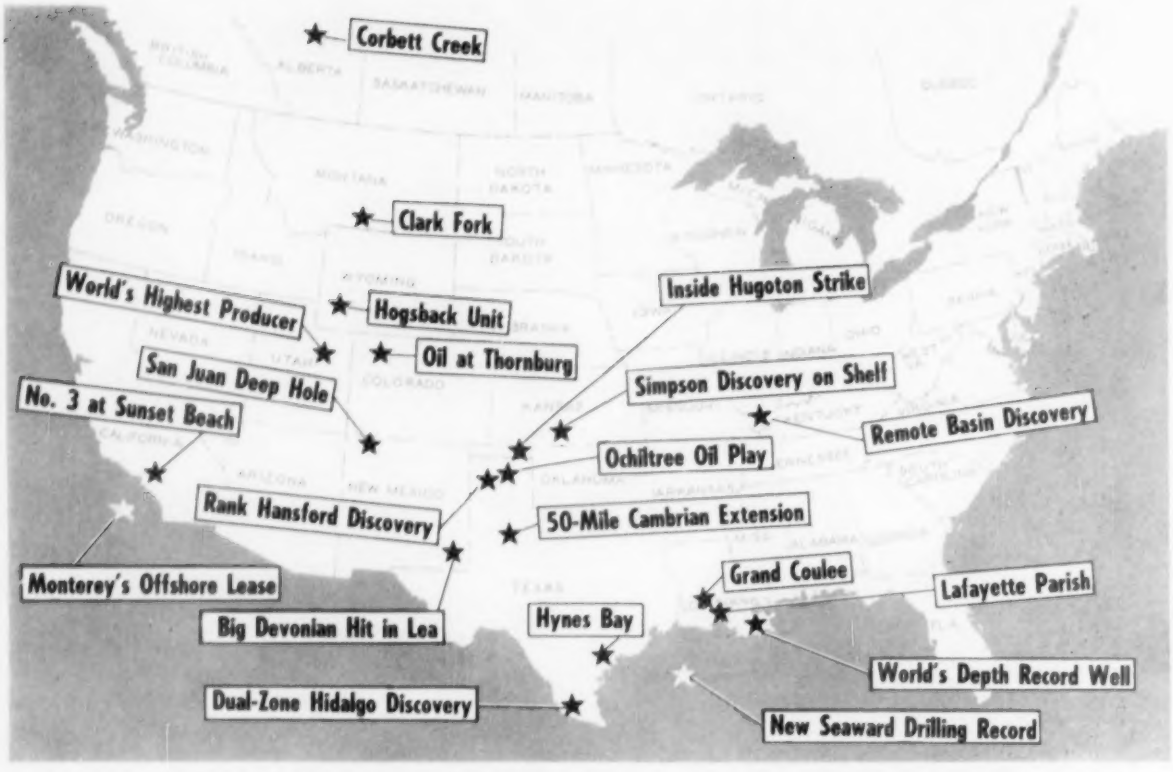
SURROUND A DERRICK that really drills.

and two large hemispheres show the world's major sedimentary basins. There's a panel devoted to foraminifera and their use, and in case you're interested, you can see a photograph of the oldest known fossil, a 2-billion-year-old fungus magnified 2,900 times.

There are dioramas of working oil fields, with tiny derricks no bigger than a match, storage tanks the size of aspirin tablets, and pumps that look like pint-size crickets at work.

The detective tools of the geologist are cleverly displayed. His Brunton compass, his hand lens, and his hammer all are there; the alidade, plane table, stadia rod, magnetometer, and gravity meter are explained in brief sketches, and visitors may actually test the principle on which the seismograph operates. Logging methods, core samples, and christmas trees all command attention in skillfully conceived displays.

This was the work of the museum and Standard Oil Co. (N. J.). The company provided technical direction and lots of financial support. Many oil service companies contributed to the joint effort, and the resulting exhibition is certainly worth a visit from every layman and every oil man. It's a tribute to you, the exploration man. If you're in New York, don't miss it. Central Park at Seventy-ninth Street.




*November excitement covers a lot of geography. Biggest news in month . . .*

# Cambrian Play in Texas Jumps 50 Miles

**by John C. McCaslin**

AFTER a leave of absence of nearly 2 years, the Cambrian play in West-Central Texas jumped back onto the exploratory scene. The Cambrian trend in that region used to be 45 miles long —now it's 95 miles.

Other November exploratory news included a bright list of new depth and elevation records, flush development wells, important extensions, and rank discoveries. Gulf Refining Co. moved the frontier of offshore oil operations nearly 50 miles from shore to establish a new seaward drilling record.

### The Cambrian Story

Until November the Cambrian trend play in West Central Texas was thought to be fading away. American Liberty Oil Co. changed all that at its 2 Shadle on the west side of Schick-Pennsylvanian field in central Stonewall County. The well was completed for a daily flowing potential of 264 bbl. of oil through 9/64-in. choke from the Wilberns-Cambrian section.

Nearest comparable production is in White Flat field, northeastern Nolan County, about 50 miles south. Location of the 2 Shadle is in 134-D H&TC Survey, 2 miles north of Aspermont. Operators reported the Ellenburger missing at the discovery well, which has been the case with many other Cambrian fields to the south.

Earlier in the fall Skelly Oil Co. opened new Cambrian production at West North Dora field in the eastern part of Nolan County. That well flowed 161 bbl. of oil per day. The company is drilling another well ¼ mile southwest of the discovery (the 2-A Boyd).

The Cambrian discovery has set off a hot leasing spree in Fisher and Stonewall counties. The thick pay sections of the Cambrian trend, good porosities and permeabilities, plus high potentials and reserve figures, and drilling in the 5,300-6,000-ft. zone make the search for Cambrian production in the region highly attractive.

### New Drilling Records

The world's deepest hole went below 22,250 ft. during the month with indications that it is going further down into the earth yet. Richardson & Bass's 1 L.L.E.-Humble "L" in Plaquemines Parish, South Louisiana, holds the deep-well record.

Another interesting drilling record was set in November, but instead of being the deepest, the well became the highest producer in the world. Three States Natural Gas Co. shut in the 1-X Joes Valley well in San Pete County, Utah, after recovering gas at the rate of 15,000 M.c.f. per day from the Ferron-Cretaceous sand. This well, located on the Wasatch Plateau, is at an elevation of 9,735 ft. The well was shut in due to the onslaught of winter in the area. Further operation must wait until spring.

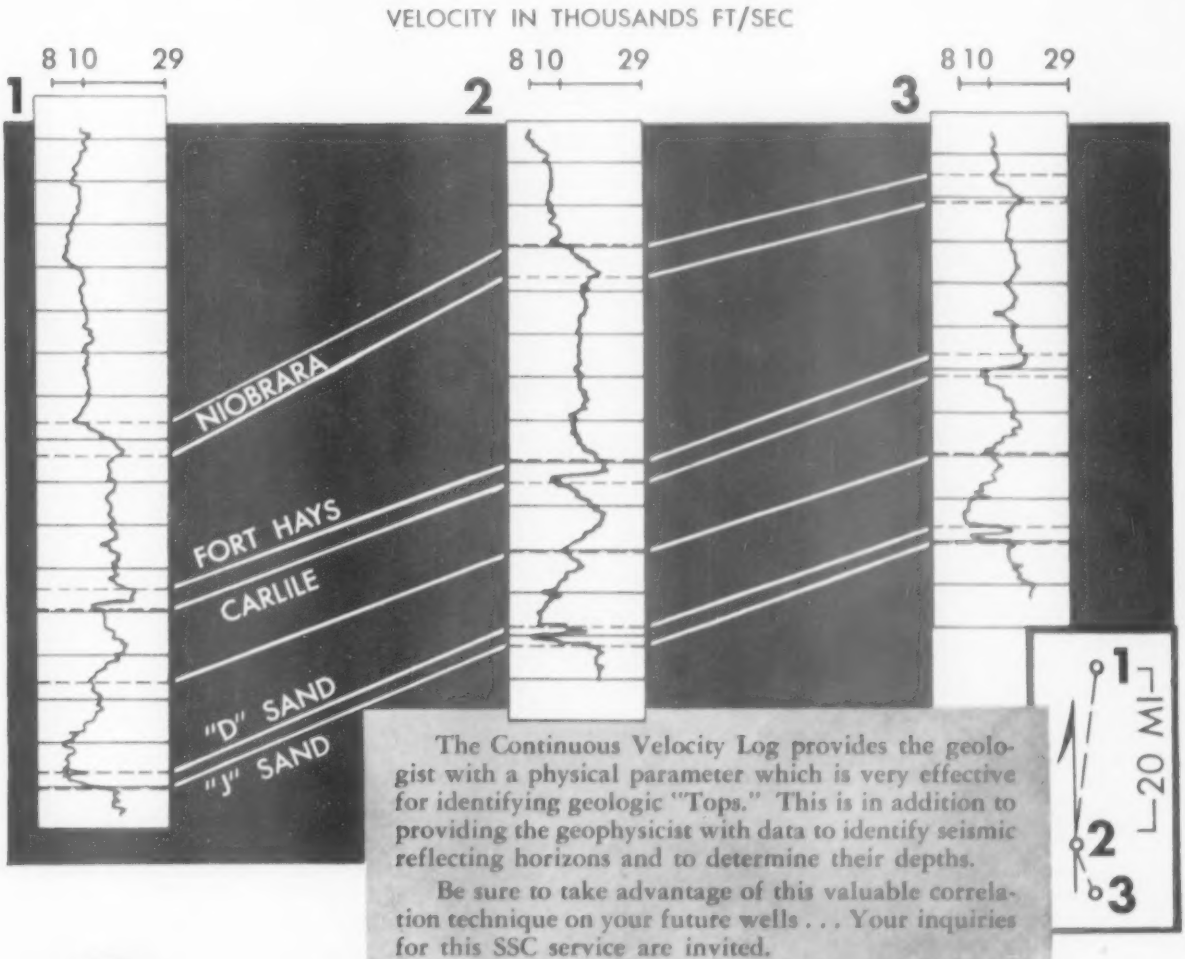
**Offshore records . . .** Gulf Refining Co. began its first test in Block 253, West Cameron area southeast of Cameron, La. This well, about 50 miles from

**CONTINUOUS VELOCITY LOGGING★**

# A *SOUND* method

## for CORRELATING and IDENTIFYING Geologic Formations

*EXAMPLE:* . . . **IN DENVER-JULESBURG BASIN, COLORADO**




The Continuous Velocity Log provides the geologist with a physical parameter which is very effective for identifying geologic "Tops." This is in addition to providing the geophysicist with data to identify seismic reflecting horizons and to determine their depths.

Be sure to take advantage of this valuable correlation technique on your future wells . . . Your inquiries for this SSC service are invited.

SEISMIC AND GRAVITY SURVEYS — PILOT CREWS — LORAC — CONTINUOUS VELOCITY LOGGING

**Seismograph Service Corporation** TULSA, OKLAHOMA, U. S. A.

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SSC of Canada • SSC of Colombia • SSC of Mexico • SSC of Venezuela • SSC (Overseas) Seismograph Service Limited — England • Compagnie Francaise de Prospection Sismique

# Total November Completions, Exploration and Development

| | Total completions | | | | | Total wildcat wells | | | | | Active |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Oil | Gas | Dry | Footage | Total | Oil | Gas | Dry | Footage | operations |
| Alabama | 2 | 0 | 0 | 2 | 8,971 | 2 | 0 | 0 | 2 | 8,971 | 13 |
| Arkansas | 74 | 44 | 0 | 30 | 225,917 | 13 | 2 | 0 | 11 | 47,280 | 78 |
| California | 215 | 135 | 8 | 72 | 1,032,301 | 66 | 3 | 1 | 62 | 380,925 | 235 |
| Colorado | 111 | 37 | 9 | 65 | 605,794 | 53 | 9 | 1 | 43 | 300,048 | 124 |
| Florida | 1 | 0 | 0 | 1 | 12,630 | 1 | 0 | 0 | 1 | 12,630 | 1 |
| Illinois | 322 | 172 | 4 | 146 | 752,939 | 49 | 7 | 1 | 41 | 99,597 | 562 |
| Indiana | 55 | 28 | 0 | 27 | 90,352 | 12 | 0 | 0 | 12 | 17,900 | 73 |
| Kansas | 372 | 167 | 29 | 176 | 1,309,660 | 95 | 12 | 3 | 80 | 377,548 | 429 |
| Kentucky | 176 | 67 | 17 | 92 | 227,624 | 50 | 4 | 0 | 46 | 54,881 | 214 |
| Louisiana | 362 | 214 | 27 | 121 | 2,411,684 | 68 | 10 | 1 | 57 | 661,861 | 420 |
| North | 195 | 119 | 20 | 56 | 718,968 | 27 | 1 | 1 | 25 | 168,089 | 129 |
| South | 167 | 95 | 7 | 65 | 1,692,716 | 41 | 9 | 0 | 32 | 493,772 | 291 |
| Michigan | 42 | 21 | 3 | 18 | 121,511 | 13 | 3 | 0 | 10 | 28,234 | 110 |
| Mississippi | 43 | 13 | 0 | 30 | 314,608 | 22 | 0 | 0 | 22 | 157,865 | 39 |
| Montana | 44 | 17 | 4 | 23 | 176,135 | 15 | 1 | 0 | 14 | 45,975 | 79 |
| Nebraska | 72 | 29 | 0 | 43 | 394,369 | 33 | 3 | 0 | 30 | 168,070 | 60 |
| New Mexico | 142 | 63 | 59 | 20 | 640,802 | 14 | 5 | 1 | 8 | 78,030 | 221 |
| Northwest | 63 | 3 | 56 | 4 | 230,520 | 7 | 3 | 1 | 3 | 31,363 | 85 |
| Southeast | 79 | 60 | 3 | 16 | 410,282 | 7 | 2 | 0 | 5 | 46,667 | 136 |
| New York | 16 | 8 | 0 | 8 | 23,200 | 0 | 0 | 0 | 0 | 0 | 11 |
| North Dakota | 25 | 16 | 0 | 9 | 182,067 | 6 | 0 | 0 | 6 | 36,925 | 26 |
| Ohio | 127 | 59 | 20 | 48 | 258,409 | 1 | 0 | 1 | 0 | 802 | 205 |
| Oklahoma | 722 | 443 | 23 | 256 | 2,271,114 | 56 | 10 | 1 | 45 | 244,250 | 1,194 |
| Pennsylvania | 71 | 9 | 48 | 14 | 179,663 | 0 | 0 | 0 | 0 | 0 | 68 |
| South Dakota | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Texas | 1,616 | 1,020 | 46 | 550 | 7,237,032 | 426 | 74 | 10 | 342 | 2,268,136 | 1,384 |
| North Central (7-B & 9) | 562 | 339 | 5 | 218 | 1,795,811 | 155 | 23 | 2 | 130 | 580,750 | 305 |
| West (7-C & 8) | 400 | 322 | 3 | 75 | 2,173,037 | 73 | 19 | 0 | 54 | 473,418 | 507 |
| Panhandle (10) | 87 | 75 | 4 | 8 | 305,505 | 7 | 2 | 0 | 5 | 49,063 | 45 |
| East (5 & 6) | 88 | 44 | 9 | 35 | 449,118 | 28 | 2 | 1 | 25 | 158,891 | 115 |
| Gulf Coast (2 & 3) | 218 | 101 | 11 | 106 | 1,459,529 | 84 | 15 | 5 | 64 | 635,919 | 214 |
| Southwest (1 & 4) | 261 | 139 | 14 | 108 | 1,054,032 | 79 | 13 | 2 | 64 | 370,095 | 198 |
| Utah | 1 | 0 | 0 | 1 | 1,945 | 1 | 0 | 0 | 1 | 1,945 | 37 |
| West Virginia | 58 | 7 | 34 | 17 | 146,257 | 3 | 0 | 1 | 2 | 9,470 | 197 |
| Wyoming | 69 | 29 | 5 | 35 | 364,644 | 25 | 3 | 1 | 21 | 138,078 | 121 |
| Miscellaneous | §6 | 0 | 1 | 5 | 28,349 | 6 | 0 | 1 | 5 | 28,349 | ¶7 |
| Total November 1955 | 4,744 | †2,598 | 337 | *1,809 | 19,017,977 | 1,030 | ‡146 | 23 | 861 | 5,167,780 | 5,910 |
| Total October 1955 | 4,648 | 2,473 | 321 | 1,854 | 18,978,089 | 1,074 | 147 | 26 | 901 | 5,236,261 | 5,812 |
| Cumulative 1955 | 51,973 | 29,055 | 3,284 | 19,634 | 207,679,010 | 11,253 | 1,682 | 321 | 9,250 | 54,248,637 | |
| Cumulative 1954 | 48,914 | 27,030 | 3,622 | 18,262 | 198,852,056 | 10,170 | 1,444 | 359 | 8,367 | 49,222,893 | |
| Western Canada | 221 | 148 | 15 | 58 | 926,219 | 56 | 10 | 9 | 37 | 277,459 | 190 |
| Alberta | 120 | 83 | 10 | 27 | 609,464 | 26 | 5 | 5 | 16 | 175,690 | |
| Saskatchewan | 68 | 38 | 5 | 25 | 242,616 | 25 | 3 | 4 | 18 | 84,734 | |
| Manitoba | 33 | 27 | 0 | 6 | 74,139 | 5 | 2 | 0 | 3 | 17,035 | |
| B.C.-N.W.T. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Cumulative 1955 | 2,638 | 1,835 | 142 | 661 | 11,556,091 | 691 | 125 | 78 | 488 | 3,418,904 | |

*Incl. 49 cond. wells: N. La. 1, S. La. 17, Okla. 6, Tex. Panhandle 1, E. Tex. 1, Gulf Coast 14, S.W. Tex. 9. †Incl. 48 service wells: S. La. 1, N. Y. 8, Pa. 8, Ohio 1, Okla. 29, S. W. Tex. 1. ‡Incl. 18 cond. discoveries: N. La. 1, S. La. 6, Okla. 3, E. Tex. 1, Gulf Coast 4, S.W. Tex. 3. §Incl. Ariz. 1 gas at 6,382; Ore. 5 dry at 21,967 ft. ¶Incl. Ga. 1.

shore and 20 miles from production, moves offshore operations to a new record distance from land. Water at the well site is 85 ft. deep. Gulf and The California Co. plan two other similar tests, one in Block 180, Vermilion area; the other in Block 160, East Cameron area. Both are between 40 and 50 miles off the Louisiana Gulf Coast.

**. . . West Newport Beach.** Monterey Oil Co. was drilling at the 1 State 1549, the first test of a 1,280-acre tidelands lease offshore from Orange County, California. The parcel now under exploration by Monterey extends 1 mile seaward from shore.

### Regional Keynoters

**Rocky Mountains . . .** British-American Oil Producing Co. recovered oil at the rate of 20 bbl. per hour on test of the Dakota sand at a wildcat 2 miles northwest of Clark Fork in Carbon County, Montana.

The 1 State is in an area of no previous drilling. Production at Clark Fork itself was found several years ago at a Frontier discovery. Dakota production was later established in the field. These wells are within the older producing area, which is northwest of Northwest Elk basin.

**. . . Hogsback Unit.** A gas flow estimated at 19,500 M.c.f. per day was reported at General Petroleum Corp.'s Hogsback Unit test in Sublette County, western Wyoming. This gage is reportedly one of the largest in Green River basin exploration.

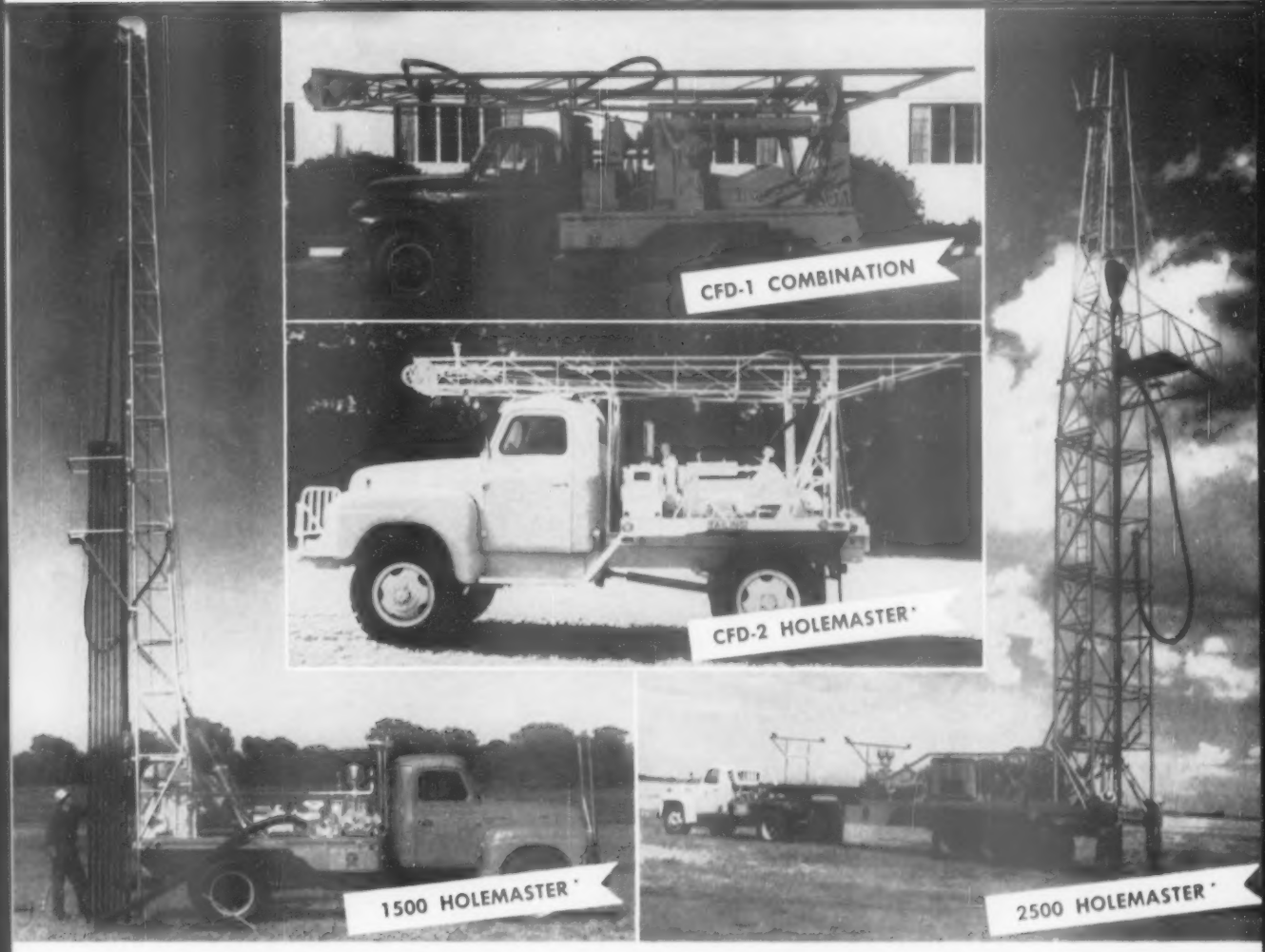
**. . . Thornburg oil.** Northwest Colorado recorded one of the province's best strikes of the year. Continental Oil Co. and Sinclair Oil & Gas Co. 3-A Thornburg Unit, Moffat County, flowed oil at the rate of 78 bbl. per hour through 2-in. tubing to open the first commercial oil pool on this old gas structure. Production is from Weber-Pennsylvanian sand.

**. . . San Juan.** Magnolia Petroleum Co. 1 Jicarilla "A," NE SW SE 18-23n-2w, Rio Arriba County, became the deepest well in Northwest New Mexico at 13,590 ft. in the granite. The well is also showing as a deep Pennsylvanian gas discovery at 12,714-12,833 ft., promising a producing-depth record for the area.

**Gulf Coast . . .** Important discoveries along the coast ranged from Calhoun County, Texas, to Lafayette Parish, Louisiana.

**. . . Hynes Bay.** Arkansas Fuel Oil Corp. has a new discovery in Hynes Bay, 2 miles southwest of Seadrift, Calhoun County, Texas. The State Tract 102 well was rated good for 156 bbl. of oil daily from Frio sand.

**. . . Grand Coulee.** This Acadia Par-

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# Total Depth Classifications, November 1955

| | A 0-1,250 ft. | B 1,250-2,500 ft. | C 2,500-3,750 ft. | D 3,750-5,000 ft. | E 5,000-7,500 ft. | F 7,500-10,000 ft. | G 10,000-12,500 ft. | H 12,500-15,000 ft. | I Over 15,000 ft. |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Arkansas | 2 | 41 | 16 | 9 | 4 | 2 | 0 | 0 | 0 |
| California | 25 | 33 | 42 | 30 | 42 | 23 | 18 | 1 | 1 |
| Colorado | 1 | 3 | 2 | 29 | 70 | 6 | 0 | 0 | 0 |
| Florida | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Illinois | 30 | 124 | 168 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indiana | 20 | 28 | 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kansas | 4 | 41 | 185 | 132 | 10 | 0 | 0 | 0 | 0 |
| Kentucky | 117 | 40 | 11 | 7 | 1 | 0 | 0 | 0 | 0 |
| Louisiana | 6 | 113 | 22 | 17 | 56 | 57 | 52 | 33 | 6 |
| North | 6 | 109 | 19 | 10 | 39 | 10 | 2 | 0 | 0 |
| South | 0 | 4 | 3 | 7 | 17 | 47 | 50 | 33 | 6 |
| Michigan | 2 | 19 | 5 | 10 | 6 | 0 | 0 | 0 | 0 |
| Mississippi | 0 | 0 | 0 | 1 | 29 | 6 | 6 | 1 | 0 |
| Montana | 2 | 17 | 10 | 5 | 3 | 6 | 0 | · | 0 |
| Nebraska | 0 | 0 | 5 | 14 | 53 | 0 | 0 | 0 | 0 |
| New Mexico | 2 | 28 | 33 | 29 | 32 | 6 | 11 | 1 | 0 |
| Northwest | 1 | 26 | 6 | 1 | 28 | 1 | 0 | 0 | 0 |
| Southeast | 1 | 2 | 27 | 28 | 4 | 5 | 11 | 1 | 0 |
| New York | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Dakota | 0 | 0 | 5 | 2 | 0 | 18 | 0 | 0 | 0 |
| Ohio | 45 | 23 | 58 | 1 | 0 | 0 | 0 | 0 | 0 |
| Oklahoma | 70 | 260 | 217 | 54 | 62 | 45 | 14 | 0 | 0 |
| Pennsylvania | 1 | 47 | 15 | 8 | 0 | 0 | 0 | 0 | 0 |
| South Dakota | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Texas | 135 | 302 | 370 | 258 | 309 | 169 | 49 | 22 | 2 |
| North Central | 80 | 191 | 115 | 82 | 79 | 12 | 3 | 0 | 0 |
| West | 8 | 41 | 101 | 84 | 75 | 45 | 24 | 22 | 0 |
| Panhandle | 0 | 2 | 76 | 0 | 2 | 7 | 0 | 0 | 0 |
| East | 2 | 13 | 19 | 8 | 32 | 12 | 2 | 0 | 0 |
| Gulf Coast | 8 | 10 | 10 | 35 | 69 | 70 | 14 | 0 | 2 |
| Southwest | 37 | 45 | 49 | 49 | 52 | 23 | 6 | 0 | 0 |
| Utah | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| West Virginia | 4 | 33 | 10 | 11 | 0 | 0 | 0 | 0 | 0 |
| Wyoming | 5 | 4 | 12 | 7 | 26 | 13 | 2 | 0 | 0 |
| Miscellaneous | 1 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| Total November 1955 | 472 | 1,174 | 1,194 | 624 | 708 | 351 | 152 | 60 | 9 |
| Total October 1955 | 447 | 1,032 | 1,150 | 663 | 780 | 366 | 139 | 62 | 9 |
| Cumulative 1955 | 4,706 | 12,494 | 13,513 | 7,347 | 8,003 | 3,667 | 1,520 | 632 | 91 |
| Western Canada | 2 | 52 | 39 | 56 | 61 | 8 | 2 | 1 | 0 |
| Alberta | 0 | 14 | 9 | 27 | 58 | 8 | 2 | 1 | 0 |
| Saskatchewan | 1 | 11 | 25 | 29 | 3 | 0 | 0 | 0 | 0 |
| Manitoba | 1 | 27 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| B.C.-N.W.T. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cumulative 1955 | 13 | 494 | 598 | 614 | 752 | 131 | 33 | 3 | 0 |

ish field was extended two ways, north and west. Vincent & Welsh and George McGhee 1 Hensgens flowed gas and and distillate to move the field 1 mile north; Lago Petroleum 1 Houssiere flowed oil to extend the field 1 mile west.

Acadia Parish got its third good oilfield discovery within 6 months at J. P. Owens & Associates et al 1 Robinson et al. The well flowed 410 bbl. of oil per day from a lower Frio sand. The new field is 7 miles south of Grand Coulee field. New Wickoff Bayou field is located 4 miles northeast.

**. . . Ridge townsite.** A rich gas-condensate reservoir was opened near Ridge in southwestern Lafayette Parish by Sunray Mid-Continent Oil Co. et al. The well flowed 533 bbl. of condensate and 2,600 M.c.f. of gas per day from the Cibicides sand of basal Frio age. Location is 2 miles south of deep gas-condensate production at Duson.

**Mid-Continent . . .** Exploratory interest in this province centered on the northern shelf of the Anadarko basin and in the basin's western portion.

**. . . Simpson.** Pure Oil Co. 1 Beals, 18 miles southwest of Robbins Ranch pool in Comanche County, Kansas, flowed gas and distillate from the Simpson-Ordovician sand to open the second field in this county. The discovery is on an indicated Simpson trend that extends southeast to Yellowstone and Farris pools in Woods County, Oklahoma.

**. . . Hansford is back.** R. H. Fulton 1-144 Bena Jones flowed 576 bbl. of oil per day from the Morrow sand to give Hansford County in the Texas Panhandle its most significant hit of the year. Location is 16 miles from nearest oil production.

**. . . Ochiltree.** Union Oil Co. of California completed two oil wells in this Texas county in an area heretofore primarily productive of gas. The two wells are in the Farnsworth area. Production is from the Morrow sand.

**. . . Inside Hugoton.** Another Pennsylvanian area was opened inside big Hugoton gas field. Panhandle Eastern 2-18 Enns, Texas County, Oklahoma Panhandle, flowed 67,500 M.c.f. of gas per day from the Morrow sand.

**West Texas-New Mexico . . .** Another deep Devonian pool was opened in the Lea County, New Mexico area between Caudille-Denton-Knowles fields. Signal Oil & Gas Co. 1 Gulf-State, 16 miles north of Hobbs in an area of intense wildcat activity this year, had a daily flow potential of 1,200 bbl.

**Southwest Texas . . .** Shell Oil Co. opened a new gas-condensate area in southern Hidalgo County in the Rio Grande valley, 12 miles northwest of McAllen. The 1 Works was completed from two zones.

**Pacific Coast . . .** A third prolific completion in a new fault block pool at Sunset Beach pointed up the growing importance of the recent discovery in this California area.

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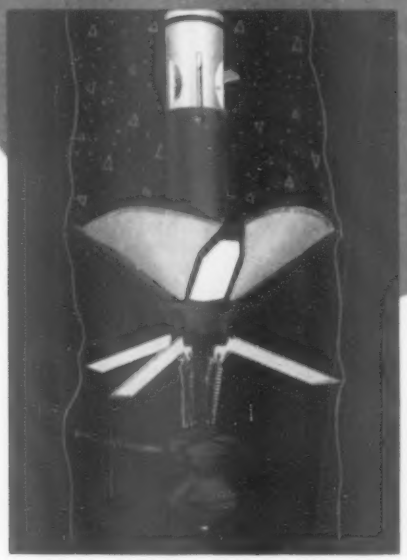

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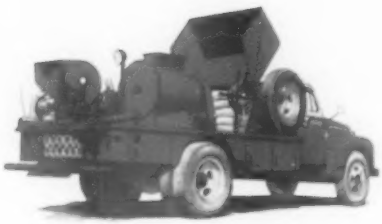

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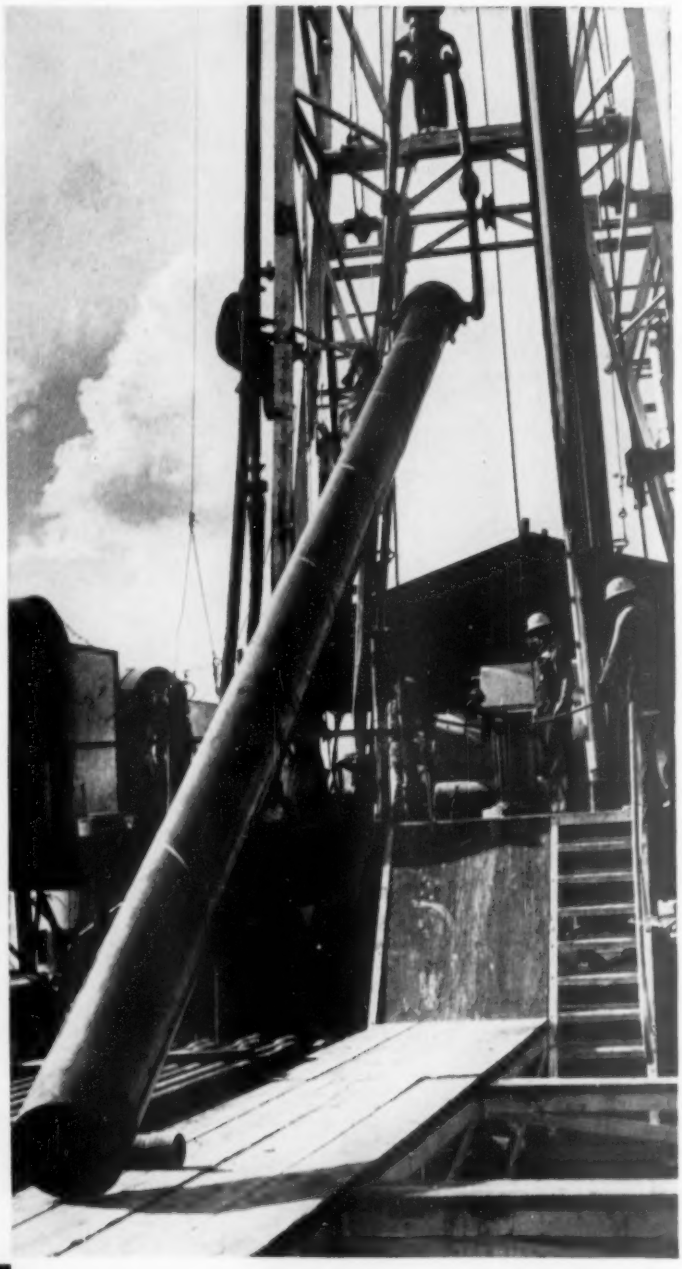

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# ARMCO SLIP-JOINT CASING

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# EXPLORATION HIGHLIGHTS

## APPALACHIAN

### OHIO

After several dry holes an oil pool is now indicated for the northeast part of Butler Township, Knox County. Harlon Oil Co. 1 (2) H. D. Stricker, Lot 14, gaged 100 bbl. in a 24-hour test after fracturing the Clinton, found at 3,135-95 ft.

● Mutual Oil & Gas Co. 1 (4) Glenn Norris, Section 4, Fallsbury Township, Licking County, ½-mile southeast of Mt. Zion pool and ⅓-mile northwest of Rock Run pool, probably shows that the two pools are connected. Clinton was logged at 2,746-78 ft. and made 310 bbl. in 19 hours after fracturing.

● A southeast extension of ⅓-mile to Flint Ridge pool was brought in by Oil Development on 1 (8) H. Dodson, Section 20, Hopewell Township, Licking County. Clinton sand at 3,263-3,304 ft. was fractured and gaged 55 bbl. in 24 hours.

### PENNSYLVANIA

Three recent completions in the north-central Pennsylvania and southern New York area indicate that the widespread exploration program in this area is beginning to pay off.

In Red House Township, Cattaraugas County, New York, northwest of Bradford, Pa., Felmont Oil Corp. encountered a flow of 8,500 M.c.f. per day from its 1 Lena Lockwood Oriskany test. The well is being cased before further testing. Top of Oriskany is 3,754 ft. and present total depth is 3,756 ft.

● In Brady Township, Clearfield County, New York State Natural Gas Co. extended Oriskany production 1 mile west in Rockton pool with the completion of their 1 Hayes. Open flow is 8,000 M.c.f. per day with a wellhead pressure of 3,800 psi. Top of Oriskany is 7,155 ft.

New York State extended production 1½ miles northeast in Greenlick pool located in Clinton and Potter counties, Pennsylvania. This latest completion, 1 State of Pennsylvania Tract 38, is in Stewardson Township, Potter County. Final open flow is 70,000 M.c.f. per day with a wellhead pressure of 2,780 psi. The Oriskany was topped at 6,856 ft. and total depth is 6,861 ft.

### WEST VIRGINIA

No completion reports were received during the past week from West Virginia. In Clover district, Tucker County, West Virginia, Hope Natural Gas Co. 9967 Walter Hovatter, wildcat, elevation 2,016 ft., recorded the Benson sand 1,361-1,428 ft., drilling 1,470 ft.

● Licking district, its 9966 T. A. Loughry logged the Tully 4,191-4,210 ft., chert 4,912-5,065 ft., Oriskany sand 5,100 ft. with gas 5,103-05 ft., testing 112,000 cu. ft. and is drilling at this depth.

● St. George district, Columbian Carbon Co. 1215 U.S.A. is drilling in lime at 5,435 ft.

### Index to area reports


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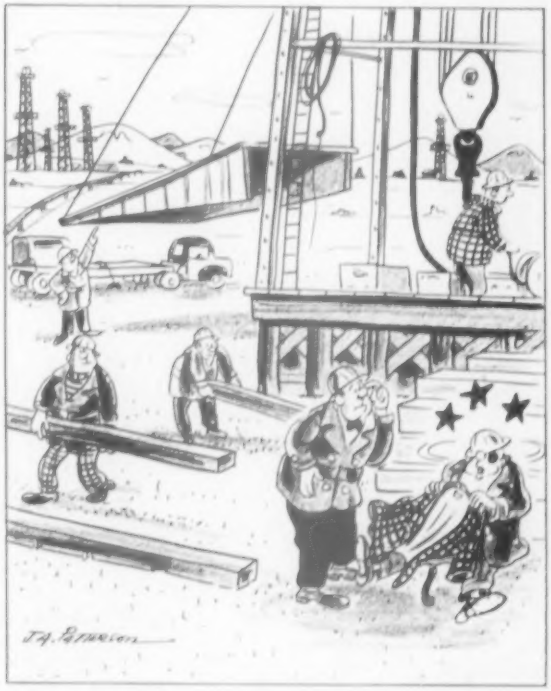

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# 9 FACTS WHY YOU SHOULD DEMAND the *New* MIGHTY MOUSE* PGAC's DEBRIS-FREE

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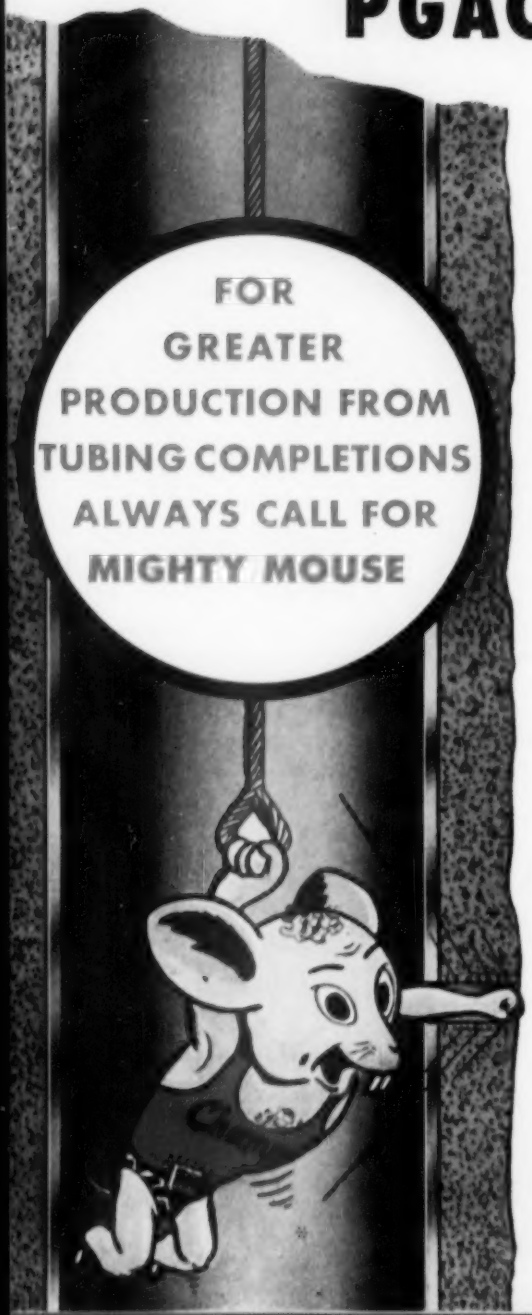


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# New Depth Record Set In San Juan Basin

Pierce Shannon

Magnolia Petroleum Co. A-1 Jicarilla set a new depth record for the San Juan basin when it went to 13,590 ft. Location is 8 miles west of Regina, Rio Arriba County, New Mexico, on the eastern fringe of the basin.

MAGNOLIA PETROLEUM CO. has set a new depth record for the San Juan basin with its A-1 Jicarilla drilled 8 miles west of Regina, in Rio Arriba County, New Mexico. The easternmost test drilled on the 750,000-acre Jicarilla Apache Indian Reservation, total depth was 13,590 ft. with granite topped at 13,565 ft.

Location is in the lower reaches on the west side of the San Pedro Mountains. Rig floor elevation was 8,000 ft. with San Pedro peaks behind it rising to 10,624 ft.

**New record due . . .** The Magnolia well may have a short tenure as a record holder in the basin, however, since Stanolind Oil & Gas Co. is under way on a proposed 14,000-ft. test ¾ mile south of Ignacio, Colo., about 100 miles to the northwest of the A-1 Jicarilla location. Both wells are a part of an intensive exploration program that will, judging from the new locations announced, will continue through the winter months.

**Company tools . . .** Magnolia used company tools on the A-1 Jicarilla. The rig was a National "100" powered with three 350-hp. Superior engines. Two C-350 National mud pumps were used.

H. M. Greenroad was drilling foreman and L. H. Proctor is production foreman for Magnolia in the area.

Surface casing of 13¾-in. was set to 513 ft., followed by 9⅝-in. casing to 4,690 ft. and 5½-in. to 12,833 ft. Magnolia reported the Dakota was topped at 7,475 ft., the Entrada at 8,445 ft., Pennsylvanian at 11,566 ft., Mississippian at 13,392 ft., and granite at 13,575 ft. A total of 17 cores were taken.

Bit record shows that fourteen 12¼-in. and 83 rock bits of the 8¾-in. size were used in drilling the well.

**Well still testing . . .** A total of 40 shots were used to perforate the interval 12,885-95 ft. and test yielded salt water. Well is being plugged back for further tests up the hole.

Crews participating in drilling this San Juan basin record-breaker credit the location with being a trouble-free operation. One minor problem of lost circulation was encountered at 6,500 ft. but 40 sacks of lost circulation material healed the break. No abnormally high pressures were encountered.

A total of 160 days elapsed time was recorded on the location with 115 days actually charged to rotating. Program called for the use of from 20 to 22 drill collars.

## SAN JUAN BASIN DATA

**Previous depth record . . . Continental 1 South Dulce, 18-23n-2w; Rio Arriba. Dry. TD 13,240 ft.**

**Producing-depth record . . . Southern Union 9 Barker Creek, 21-32n-14w; San Juan. Penn. gas at 9,468 ft.**

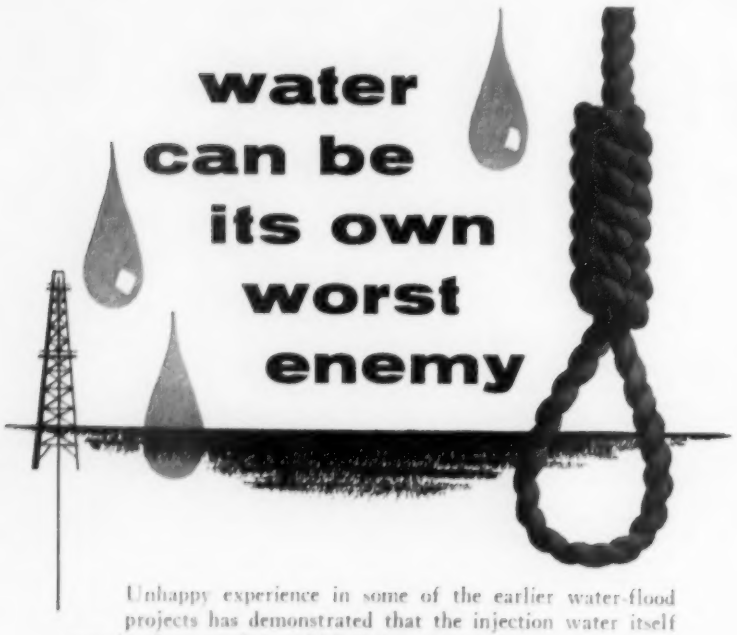
| | |
|---|---|
| Active location New Mexico portion New 1955 fields: | 85 |
| Oil | 8 |
| Gas | 11 |
| Total wells completed 1955 | 558 |
| Number of wells drilled below 10,000 ft. | 2 |

Author is petroleum correspondent, Dolores, Colo.

Regional setting of San Juan basin's deepest hole.

Typical of wells drilled in the San Juan basin generally and on the Jicarilla Apache Indian Reservation specifically, water for the A-1 Jicarilla was bought from a local contractor who hauled it from small reservoirs on the reservation to location. Note storage capacity of the two water tanks.

APPLIATE COMPANIES: CANADA – Perforating Guns of Canada, Ltd.; Edmonton, Alberta
GERMANY – Atlas Deutsch- Amerikanische Olfelddienst G. m. b. H.; Kiel VENEZUELA – Servicios Tecnicos Atlas, C.A., Caracas




Unhappy experience in some of the earlier water-flood projects has demonstrated that the injection water itself may be the very thing which defeats the project . . . because it can carry into the formation the precipitants, algae and bacteria which have been established as major causes of formation-plugging.

But, today, many of the advanced water-flood projects now in operation have no trouble at all from this source. They have installed modern diatomite filtration systems and, using Dicalite filteraids, are filtering out completely the microscopic water-borne solids which could slow or halt the water drive. That's because Dicalite filtration is so "sharp" that it traps unwanted solids even down in the sub-micron size range: up to 95% of all bacteria can be removed by Dicalite filtration.

Diatomite filtration systems take up little room—about 1/5 that required for the older, less-efficient sand filters—and their installation costs are comparatively low. In addition, diatomite filter systems can be moved to another location when and if desired; in fact, some of the newer systems are completely unitized for easy hauling.

If you'd like your water-flood project to continue at its designed input pressure, instead of watching pump pressures continue to climb, day by day—if you'd like to free your mind of at least one problem in a re-pressuring project—investigate the advantages of Dicalite filtration as used and proved by other operators. A new Dicalite Bulletin, now in preparation, covers the subject in detail . . . send in your name and we'll send you your copy as soon as it's printed.

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## EASTERN INTERIOR

### KENTUCKY

### New Bulletins Available

"Geology of Decide Pool, Clinton County, Kentucky," by Jerome Hunt Perkins, Bulletin No. 17, is available from the Kentucky Geological Survey at the University of Kentucky in Lexington.

Decide pool produces from the Granville sand, a Middle-Ordovician limestone. It is the only pay for this south-central Kentucky area in which production is long-lived. The report is an analysis of geological relationships responsible for the pool and probably other Granville pools.

Also available from the survey is "Some Old Chester Problems-Correlations of lower and Middle Chester formations of Western Kentucky," Bulletin 16.

This study was undertaken in an attempt to settle problems of stratigraphic correlations. There were certain differences in the conclusions arrived at by workers on the outcrop and those engaged in subsurface work in petroleum geology. It is an attempt to eliminate these differences. This report is by A. C. McFarlan, D. H. Swann, F. H. Walker, and Edmund Nosow.

## MID-CONTINENT

### KANSAS

### Operator Sets Casing at New Ness County Strike

Harry Gore Co., Welch & Olson and N. Appleman 1 Moore is a new Mississippian dolomite discovery in southeastern Ness County. The discovery, located in NW NW SW 34-19s-21w, 5½ miles southwest of Webs pool of Rush County, recovered 30 ft. heavily oil-cut mud, 150 ft. muddy oil, and 30 ft. mud on a drill-stem test at 4,415-30 ft.

### Southwest Hilger Pool Has Perfect Record

A 100 per cent success ratio is reported at Fleming & Woodman and Oyster's Southwest Hilger pool in the southeast part of Reno County..

The prolific field has seven wells out of seven trys. The newest big well is the 3 Tony Geubelle, NW SW NW 29-26s-4w. The well flowed 42 bbl. per hour for 4 hours on 5-in. casing after 250 gal. acid treatment. The

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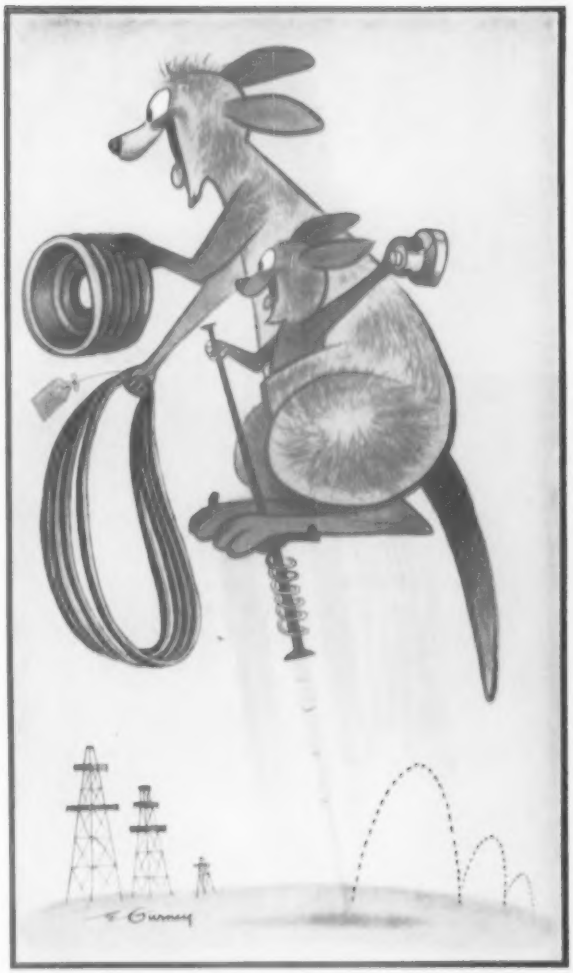

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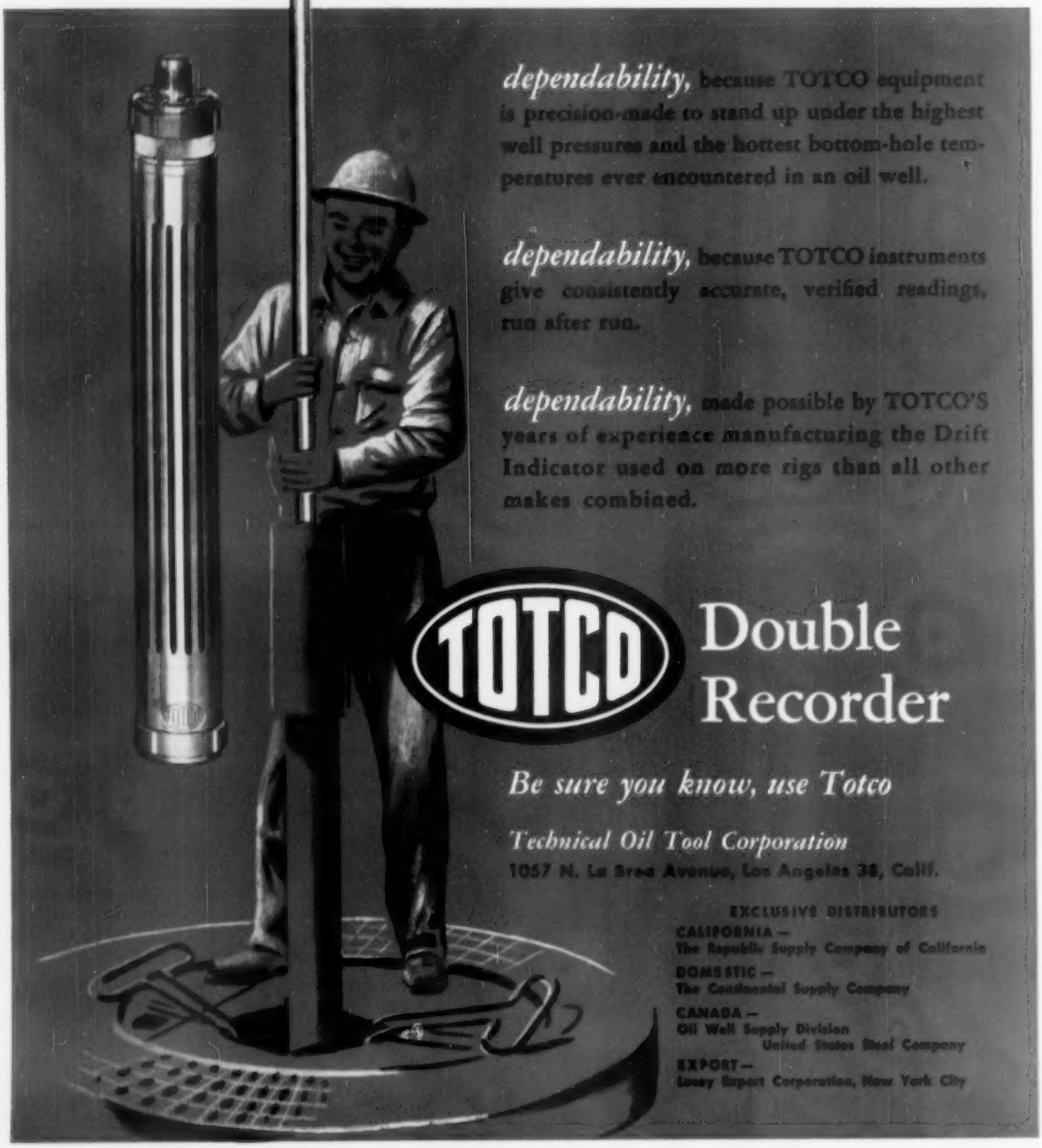
*dependability,* because TOTCO equipment is precision-made to stand up under the highest well pressures and the hottest bottom-hole temperatures ever encountered in an oil well.
*dependability,* because TOTCO instruments give consistently accurate, verified readings, run after run.
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producing zone is the Viola at 4,013-15 ft.

The discovery well was the 1 Geubelle, NW NW NW 29-26s-4w. That well was completed early last spring with a potential of 232 bbl. of oil per day from the Viola. There are four Viola wells and three Misener sand wells. Shows have been logged in the Kansas City lime and in the Mississippian.

**Hilger pool . . .** Two miles northeast Hilger pool itself has produced 4,500,000 bbl. of oil from 27 wells.

Indications are that the new Southwest Hilger pool will continue growing and extend to the south and southwest.

OKLAHOMA

### Arbuckle Lime Gas Gaged at Cumberland

Pure Oil Co. 3 Stewart, NW SE NE 28-5s-7e, Bryan County, flowed 4,495,536 cu. ft. of gas per day on 1-in. choke from perforations at 6,798-6,810; 6,848-65, and 6,882-6,914 ft. in the Arbuckle lime. This Cumberland field test was deepened to 7,011 ft.

## HUGOTON EMBAYMENT

OKLAHOMA PANHANDLE

### Oswego Production Proved At Northwest Mocane Well

Oswego lime production has been proved at Kerr-McGee Oil Industries, Inc., 1 Raymond in C SW NW 31-6n-25eCM, Beaver County. The Northwest Mocane area well flowed 4,070 M.c.f. of gas per day at 5,525-45 ft.; decreased to 2,740 M.c.f. per day at end of 20 minutes and gaged 2,000 M.c.f after 25 minutes.

**Mocane pool . . .** Pure Oil Co. moved this area's limits north at 1 Judy-B, C NE SW 5-5n-25eCM. The well flowed 1,200 M.c.f. of gas per day on Morrow test at 6,164-6,206 ft.

### Southwest Beaver Test Is Indicated Discovery

Another Morrow producing area is indicated for the mushrooming play in southwestern Beaver County. The indicated discovery is Warren Petroleum Corp. 1 Harris, C SE NE 19-1n-21-eCM. Location is between new East Camrick and Dower fields, both Morrow oil producers.

The well tested the Morrow at 7,418-46 ft., recovering 245 ft. of oil.

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other Morrow gas discovery for this area in the making at 1 Frantz, C SW NE 10-2n-21eCM. The well gaged 1,000 M.c.f. of gas per day on test of the Morrow sand at 7,104-23 ft.

**Dower field . . .** The discovery well of this new Morrow area, Sunray Mid-Continent 1 Palmer in NE NE SW 28-1n-21eCM, flowed 5 bbl. of distillate per day on ¼-in. choke and tested 10 bbl. in 24 hours from perforations at 8,042-62 ft.

## ARK-LA-TEX

### Extension to Esperance Point Makes Big Flow

The extension well to Esperance Point field in Concordia Parish, Jett Drilling Co., Inc., A-3 Hogue-Esperance, flowed 828 bbl. of oil per day from two zones of the Wilcox.

The well, 7-5n-9e, flowed at the rate of 336 bbl. of 41°-gravity oil daily on 9/64-in. choke from Harman sand perforations at 6,564-68 ft. This sand produces at Nearby Kingston field in Adams County, Mississippi. The well flowed at the rate of 492 bbl. of 40°-gravity oil per day on ¼-in. choke from the Walker at 6,623-27 ft.

Other producing sands in the field are the Campbell and the Barksdale. The best pay sand yet in the field is the Campbell.

## EAST TEXAS

### Cherokee Wildcat Shows; New Tests Slated

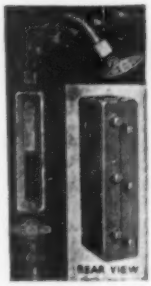
Cherokee County had prospects of a Woodbine sand strike at Monsanto Chemical Co. 1 Bolton, 3 miles northwest of Maydelle, and two Woodbine tests were announced.

Monsanto's well flowed gas and returned a small amount of oil-cut mud on a drill-stem test at 4,676-78 ft. Bottom-hole flowing pressure was 1,640 psi.

At 4,678-83 ft., gas surfaced in 3 minutes, and recovery in the pipe was 5 ft. of condensate and the same amount of mud cut with oil and distillate. Gas volume on the test was estimated at the rate of 2,300 M.c.f. per day. Bottom-hole flowing pressure was 1,455 psi.

Further cores had more shows, and a test at 4,683-88 ft. flowed 2,500 M.c.f. of gas, and recovered about 10 ft. of oil and gas-cut mud, plus 90 ft. of green oil. Bottom-hole pressure increased to 1,705 psi. The last core reported, from 4,688-4,711 ft. had further shows in the top but the last


## Advantages of the INFERNO "Clamp Type" Reflex Gages

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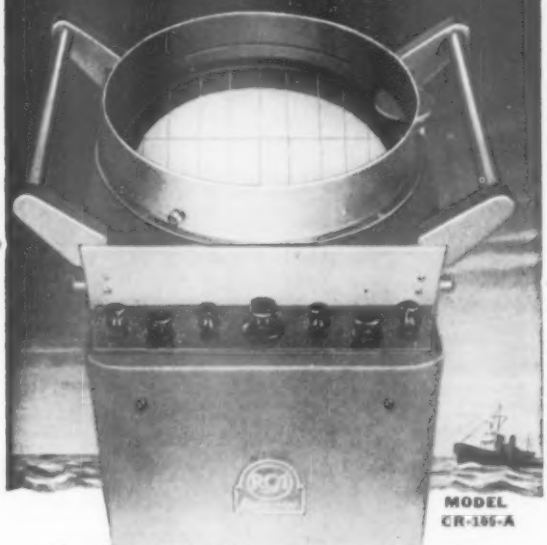

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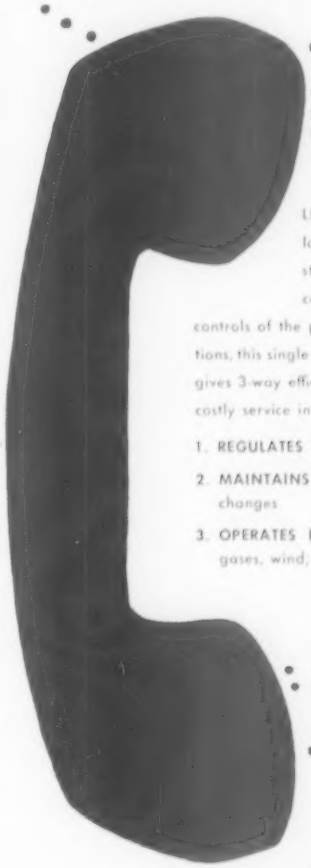
Talk about new developments...Partlow's new heater-treater thermostat isn't affected by sour gases, wind or sand!



LET US SHOW YOU how Partlow's new Model 86 Thermostat Control eliminates failures common to Heater and Treater controls of the past. Tested under all conditions, this single unit, mercury actuated system gives 3-way efficiency that stops oil loss and costly service interruptions . . .

1. REGULATES TEMPERATURE PRECISELY
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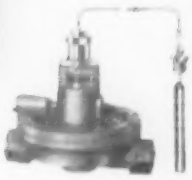

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# Pressure Control Equipment!

WHEN YOU are in the market for pressure control equipment, be sure to contact Shaffer before you make your final decision. Shaffer offers to the industry the most complete line of pressure control equipment—including both Hydraulic and Mechanical Cellar Control Gates—*equipment that is field-proven for safety, simplicity and rugged dependability!*

Note below some of the unique advantages that have made Shaffer the leading choice in pressure control . . .

## SHAFFER HYDRAULIC CELLAR CONTROL GATES

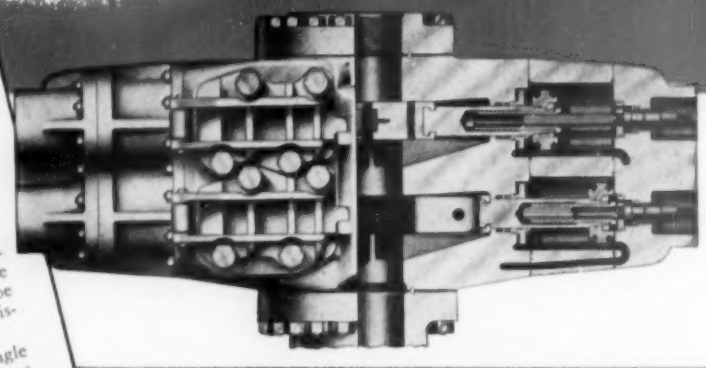
**combine proven dependability with maximum compactness!**

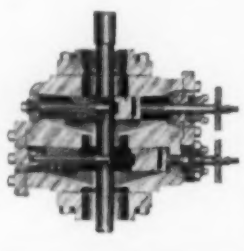
▶Side-opening doors permit quick, easy ram changes without need for expanding critical height or length dimensions to allow room for changing rams.

▶To change rams, simply open the door, replace the rams, then bolt the doors shut again. Closing the doors automatically aligns the rams in the Gate. In Shaffer Double Gates, there is no need to disassemble the upper unit to change rams in the lower unit. Rams in *either* compartment can be changed separately and independently—without disturbing the *other* compartment!

▶Available in both Double (illustrated) and Single designs to provide maximum flexibility for various well requirements. Even in sizes as large as 13⅝" (12" Series 900) the Double Gate provides *two* ram compartments in an overall height of only 30". Smaller sizes require even less space!

*There are many other unique features. Be sure to get the complete story before you buy any control gate equipment. Available in a complete range of sizes and pressure ratings!*



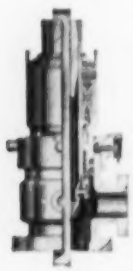


## Shaffer Mechanical Cellar Control Gates

▶Available in both Double (illustrated) and Single types for operation by compact air drives—*plus manual stand-by!*

▶Require very little space—less than 29" height for the Double Gate in sizes as large as 13⅝" (12" Series 900)—*smaller sizes even less!*

*Easy ram changes . . . Self-draining gate bottoms . . . Quick, easy installation, and many other advantages make these Gates outstanding where mechanical operation is desired!*



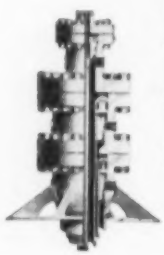
## Shaffer Combination Rotating Blowout Preventers and Strippers

**—combine in one unit every necessary feature for simplified pressure control while drilling!**

▶Available in two types—Type 50 for general drilling operations through 10¾" casing and larger . . . and Type 51 for slim hole drilling, production and re-work jobs.

▶Both maintain a continuous seal around the various diameters and shapes in the drill string—round, square or hexagonal—whether string is rotating, being raised or lowered, or is stationary.

*Nothing else combines the simplicity and safety of this equipment for pressure control while the drill string is in the well.*



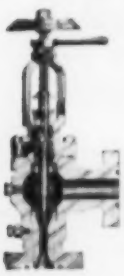
## Shaffer Landing, Casing and Tubing Heads

**—there's a size and type to meet your requirements!**

▶Available in a wide range of types and packing designs.

▶For maximum compactness, Base Heads and Combination Base, Casing and Tubing Heads are available for combining several units in one.

*No matter what your well completion problem, Shaffer can supply field-proven Landing, Casing and Tubing Heads to meet your requirements.*



## Shaffer Adjustable Flow Beans

▶Ideal for controlling fluid flow on drilling and producing wells, in refineries, gas plants and other operations where accurate control of fluid flow is essential.

▶Available with Conical, Micro and electrically-heated Thermo Tips (both regular and hard metal) in all popular sizes with either flanged or screwed connections.

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22½ ft. carried water. Operators were coring ahead below 5,412 ft.

New tests planned included Harry Mummert, Jr. 1 Acker and Keller, 5,300-ft. wildcat 3 miles south of Jacksonville, in M. Garcia Survey. It will check the Woodbine.

Paul Barkley 1 Alexander was scheduled as a 4,400-ft. Woodbine test 1 mile southwest of Mixon, in the Stephen Jarboe Survey, also in Cherokee County.

## WESTERN CANADA

### SASKATCHEWAN

### New Mississippian Oil Strike in Steelman Area

Imperial Oil, Ltd., has added another oil discovery to its list in the Steelman area of southeastern Saskatchewan, 1½ miles northeast of Steelman railpoint and 2½ miles northeast of nearest production. The well indicated an oil zone in both the Charles and Mission Canyon sections of the Mississippian.

This strike was made at Imperial 3-26 Steelman, LSD 3, 26-4-5w2. During the series of tests run in both the Charles and Mission Canyon, varying amounts of oil, oil-cut mud and salt water were recovered. Crew has drilled to total depth of 5,388 ft., set production casing, the hole is standing, waiting on service rig for completion.

### MANITOBA

### Maple Area Wildcat Indicates Commercial Strike

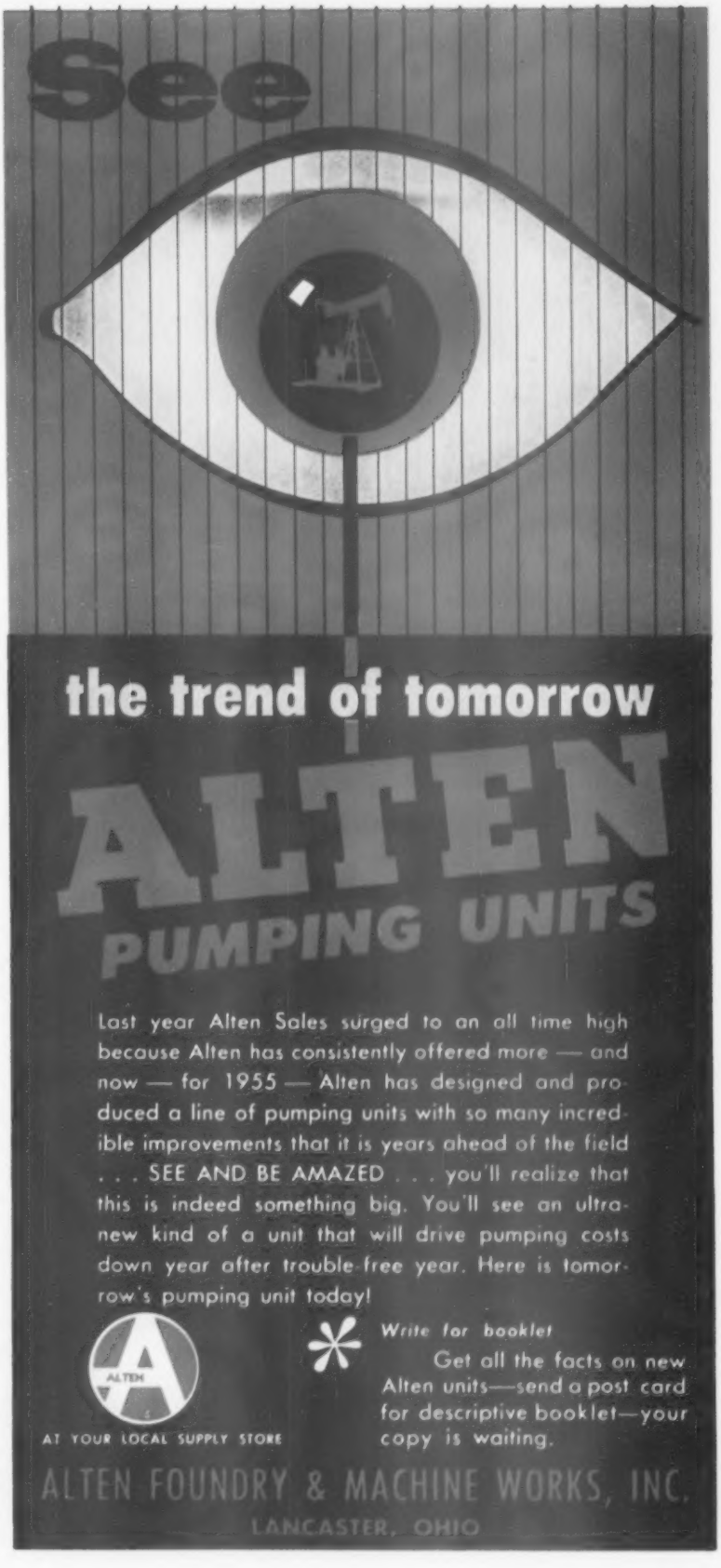
British-American Oil Co., Ltd., and Hudson's Bay Oil & Gas Co., Ltd., have indicated commercial oil production at their wildcat in the Maple area of southwestern Manitoba during initial potential tests run at the well. This recent completion was drilled on a lease tract which is located 2 miles southeast of Maple and 4 miles south of Virden-Roselea oil field.

This recent discovery, 7-26 South Maple, found oil in the Lodgepole-Mississippian. During initial 8-hour test of the interval 2,121-26 ft., the well flowed light-gravity oil at the rate of 16 bbl. hourly.

### ALBERTA

### Mississippian Strike Due South of Westward Ho

A new Mississippian light-gravity oil area is indicated 6 miles south of Westward Ho field and 18 miles southwest of Olds. The new strike is Oilwell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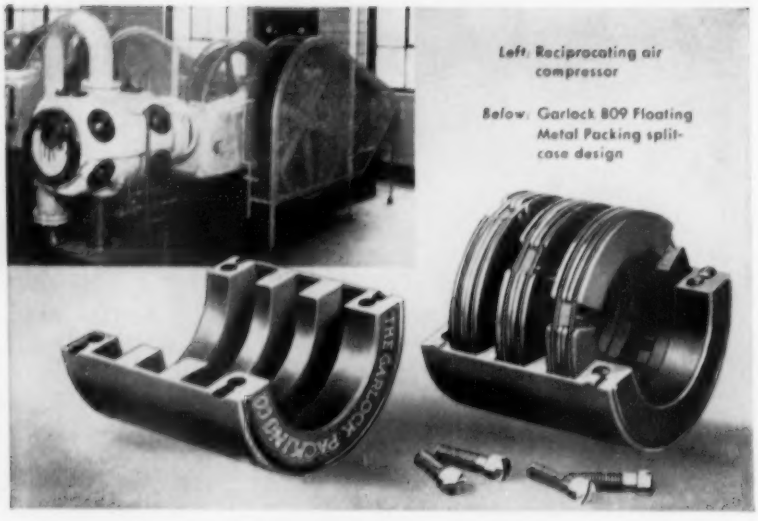


*Left.* Reciprocating air compressor

*Below.* Garlock 809 Floating Metal Packing split-case design

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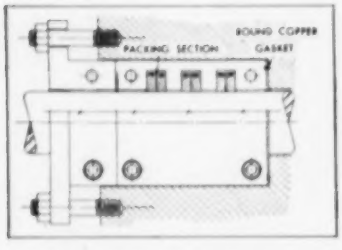
have 2 big advantages

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The first drill-stem test of the Mississippian at 9,142-57 ft. flowed gas at the maximum rate of 80 M.c.f. per day. When pipe was pulled it had 520 ft. of clean 36°-gravity oil. A second test at 9,168-85 ft. made 31 M.c.f. of gas with pipe recovery of 1,660 ft. clean oil. Mississippian top was not reported. Crew will core and test the complete Mississippian zone.

## PACIFIC COAST

### CALIFORNIA

### Richfield Gets Promising Test in Eocene Field

Richfield Oil Corp's second test in its new Eocene field discovered last August in the Wheeler Ridge area has shown considerably more promise than the discovery well. On a 2-hour test, 73-31 KCL D, which is located about ½ mile northwest of the discovery, flowed at the rate of 787 bbl. daily of 40°-gravity crude through a ½-in. choke. The test flowed gas at a 5,000 M.c.f. rate until oil surfaced and then settled to 54 M.c.f. The field discovery, 84-31 KCL D, completed August 18, was brought in for 287 bbl. daily but after 4 days, production had dropped to 89 bbl. daily.

The producing interval of 73-31 KCL D is 10,516-93 ft. while that of the field discovery well is 10,665-10-758 ft. This Eocene field is located about 1½ miles southwest of Wheeler Ridge in southern Kern County. An offset to 73-31 KCL D has already been staked by Richfield.

### Douglas Redrills Offshore Test

Douglas Oil Co. of California has plugged back 2 Douglas Oil from 5,482 ft. to 4,000 ft. and was preparing to redrill. This is the second slant-drilled test by Douglas at its 320-acre lease offshore from Hunting Beach. The first well was completed for approximately 100 bbl. daily.

### Shell Fails to Extend East Strand Production

Shell Oil Co. failed to extend production to the southwest of its two pools discovered last summer in East Strand field of Kern County. Shell was moving out the drilling rig preparatory to abandoning 74-8 KCL, a 9,969 ft. test located 1,000 ft. southwest of 83 KCL, the discovery well. Shell dually completed 83 KCL last August in the

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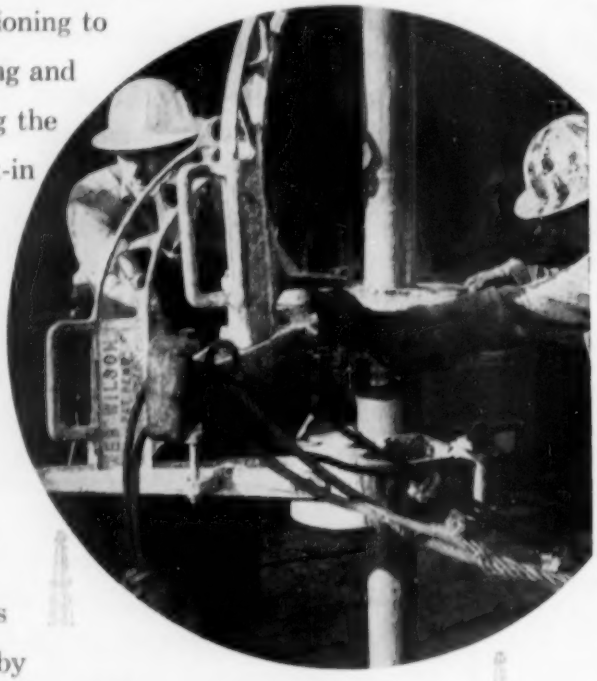

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first Stevens zone at 8,090-8,100 ft. and in the "83 Sand" at 9,771-9,851 ft. Initial production in this well was 435 bbl. daily of 33°-gravity crude.

### WASHINGTON

## Two Down, One to Go In Pacific Northwest

The staking of one site and the abandonment of two tests highlighted recent exploratory activity in the Pacific Northwest. Standard Oil Co. of California announced plans to drill a wildcat 2 miles north of the town of Sequim on the Olympic Peninsula in Washington.

Standard abandoned an Oregon wildcat earlier this month at 7,594 ft. This test, 1 Pexco, was located about 40 miles southeast of Prineville in the Paulina area of Crook County. Richfield Oil Corp. abandoned 1 Weyerhauser in the Grays Bay area of Wahkiakum County, Wash., at 9,110 ft.

## GREAT LAKES

### MICHIGAN

First follow-up Detroit River oil test in the Salem-Dorr area, Allegan County, logged an oil pay in this objective that, on the basis of early, natural showings, appeared to be better than the 11-bbl. discovery producer.

New well in this important area is Ford Oil Co. 1 Graczyk, NW SW NW 30-4n-12w, the east 20-acre offset to the credited discovery well. This new well carried about 550 ft. of free, and very little, if any, water natural in 48 hours. Hole was drilled to 2,098 ft. with showings reported between 2,087-97 ft. The 1 Graczyk was scheduled to be acidized.

Zellman, driller of the discovery producer, immediately announced plans to squeeze-cement upper porosity in the Detroit River at the discovery from which he is convinced that the 100 bbl. of water recovered daily with oil production is coming. He likewise was moving tools to the diagonal southeast 20-acre offset to the discovery, while Earl Cole was preparing to spud in at the west 20-acre offset to the first producer, on a leased farmed from Zellman.

● New A-1 dolomite gas discovery well in the basal Salina at Panhandle Eastern Pipe Line Co. 1 Teltow, NE NE NW 22-4n-15e, Casco Township, St. Clair County, was gaged natural at 780,000 cu. ft. about 3 hours after hole was cleaned out. First gage, which did not hold, was reported as 5,000,000 cu. ft. Well was acidized, and on the basis of unofficial reports, this treat-

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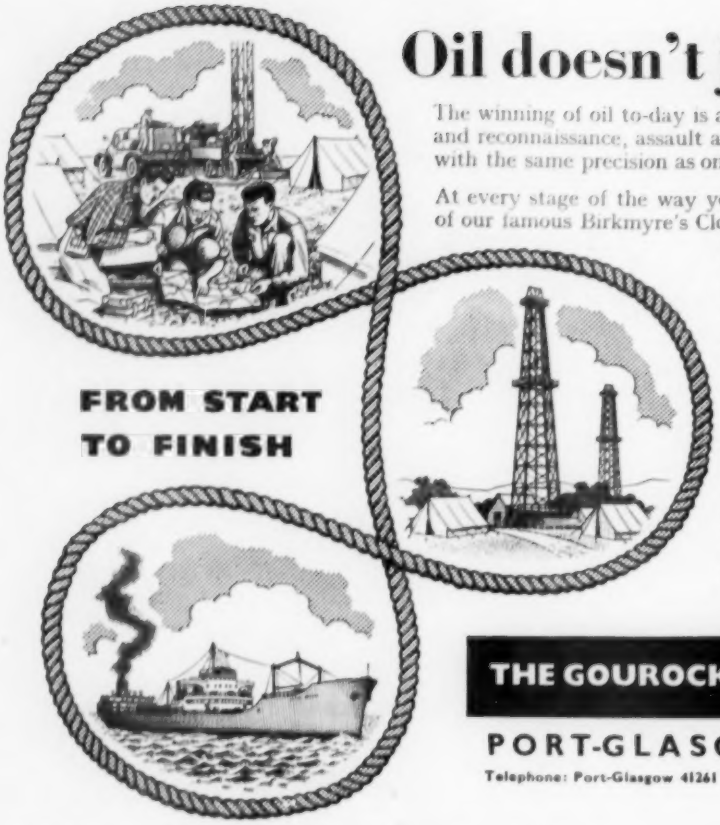

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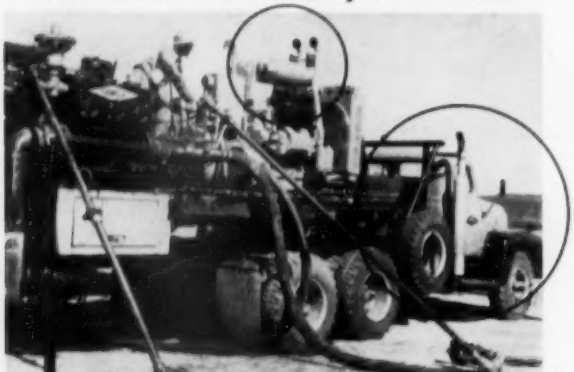

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ment boosted gas flow to 2,500,000 cu. ft., gage.

Panhandle 1 Teltow was bottomed out at 2,443 ft. with at least 57 ft. of pay cored up to 2,437 ft. Further production tests were in progress.

## WEST TEXAS-NEW MEXICO

### WEST TEXAS

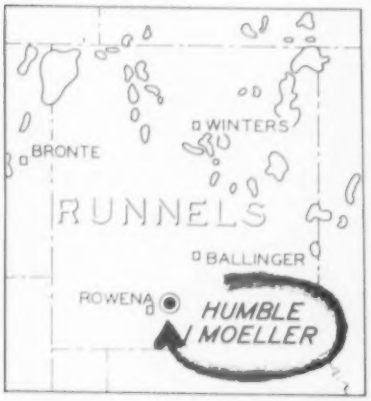
### Shallow Ector Strike Is Big Oil Producer

Texas Crude Oil Co. 1-8 Wight, Section 8, Block 43, T1S-T&P Survey, in north-central Ector County has been completed as a flowing Grayburg discovery. Operators have asked for a new field designation of West Cowden-Grayburg.

Daily calculated potential was 2,878.44 bbl. of oil, with no water. This was based on a 4-hour flow of 479.74 bbl. through ¾-in. choke, under tubing pressure of 360 psi., and gas-oil ratio of 810:1. Gravity was 31.8°.

Location of the well is approximately 5 miles east and slightly south of Goldsmith, and ¼-mile west of a 4,411-ft. dry hole.

**Pecos County . . .** Tide Water Associated Oil Co. 1 White and Baker, Ellenburger test on south flank of White & Baker field, reported sample-top of the Devonian at 8,070 ft. Its minus datum point of 5,091 ft. was said to be 60 ft. lower than Helmerich & Payne's 9-C Baker, located 1 mile northeast. Tide Water's test ran high on the upper markers.




**Map shows location of Humble Oil & Refining Co. 1 Moeller, new Flush limestone discovery in Runnels County. Potential was 454 BOPD, through ¼-in. choke, from lower Capps limestone at 3,718-30 ft.**

**Dean pay from Pennsylvanian . . .** Tennessee Transmission Co. 1 Fambrough, 2½ miles east of Ackerly in extreme southwestern Borden County, has been plugged back for recompletion as a Dean sand discovery. The well was originally completed in the Pennsylvanian.

At this report, the well was pumping an average of 70-90 bbl. of oil a day from perforations at 8,215-33 and 8,240-52 ft. in sand.

**Gaines County confirmation . . .** The Seagraves-Devonian field gained a second producer and southeast offset at Anderson-Prichard Oil Corp. 2 Webb, in 20-C35-PSL Survey. On test of the Devonian at 12,950-13,050 ft., clean oil flowed in 1 hour, making 199.8 bbl. in 1½ hours.

No. 2 Webb also indicated Pennsylvanian production at 11,435-93 ft., where it flowed 108.9 bbl. of oil in 5¼ hours.

**Nolan County, new pay . . .** Skelly Oil Co. 1-E Boyd, Strawn reef discovery in the EVB (Ellenburger and Palo Pinto) field, 5 miles northwest of Nolan, has been completed as a flowing well.

Calculated daily potential was 1,399 bbl. of 40° oil, based on an 8-hour flow of 466 bbl. through 18/64-in. choke. Perforations were between 5,653-82 ft. No. 1-E Boyd was dry in the Ellenburger at 6,539 ft.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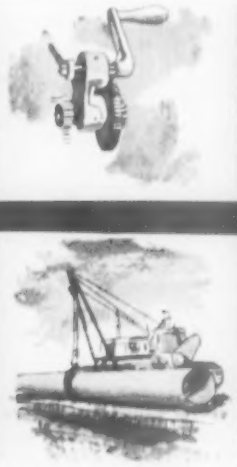

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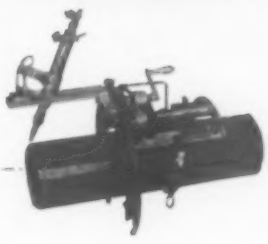

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## ROCKY MOUNTAIN

### WYOMING

### Tensleep Tested at Washakie County Confirmation Well

British-American Oil Producing Co. is testing in the Tensleep at 1 Hoenshell-Government, C NW NW 17-47n-90w, Washakie County.

This well is a confirmation to Stanolind's 4 Cottowood Creek Unit in C SE SE 7-47n-90w, a Phosphoria step-out test that made 956 bbl. of oil per day. British-American recovered 830 ft. of free oil on a test at 5,555-5,600 ft. They recovered 170 ft. slightly oil-cut mud on test of the Tensleep at 5,884-5,938 ft.

### NEBRASKA

### Reperforation Reported at Hitchcock County Strike

Jones, Shelburne & Farmer have plugged back to 3,880 ft. and are reperforating at 1 Fritz, Hitchcock County discovery in NW NW SE 35-3n-31w, on the Cambridge Arch.


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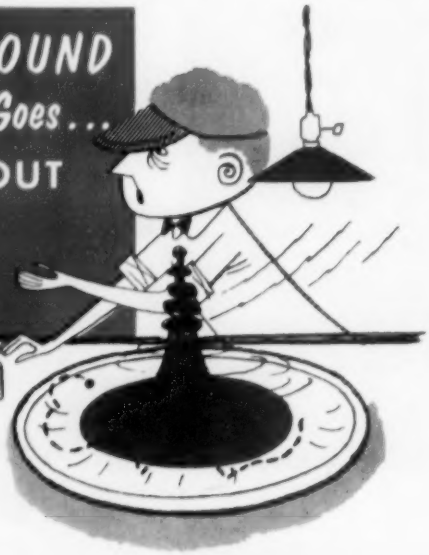

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The operator reportedly swabbed 7 bbl. of oil per hour from Lansing-Kansas City Pennsylvanian perforations at 3,881-86 ft. This strike is 100 miles southeast of nearest Nebraska production at Big Springs gas field, Deuel County.

### Kimball Confirmation Finaled For 450 BOPD in "J" Sand

S. D. Johnson has completed the confirmation well to Watkins Oil Co. 1 Cizek, W½ SW SW 3-16n-53w, Kimball County. The 1 Cizek, SW NE SW 3-16n-53w, made 450 bbl. of oil per day on pump from open hole in the "J" sand.

Superior Oil Co. 87-4 Kosch, NE SE SE 4-16n-53w, another confirmation try, was dry. Watkins is drilling at the 2 Cizek in SW SW NE and has made location for the 3 Cizek in SW NW NE. S. D. Johnson is swabbing at the 2-B Cizek in NE SW SW 3 and has made location for 2 Cizek in NE NE SW 3-16n-53w.

### COLORADO

### Testing Under Way at Washington County Hit

Anderson-Prichard and Delta Drilling Co. pumped 210 bbl. of oil in 19 hours at the 1 Swan in C SW SE 21-2s-56w, Washington County. This well is the discovery well of Swan field. Production is from perforations at 5,157-62 ft. in the "J" sand.

Location of the new pool-opener is 2 miles west of Plum Bush Creek field and 3 miles southeast of Little Beaver field.

### Apparent Discovery In Adams County Area

Elpasgar Oil Co., Balderson Drilling Co. and Shawano Oil & Development Co. 1 Rosener, SW SW SW 8-1s-59w, is a new Adams County discovery prospect. The operators are ready to perforate after recovering 600 ft. of gassy oil, 540 ft. of water and 90 ft. of mud on a drill-stem test in the "J" sand at 6,213-42 ft.

A second test at 6,213-32 ft. got 291 ft. of oil and 90 ft. oil and gas-cut mud. A third test at 6,130-38 ft. made 720 ft. slightly gas-cut mud. This new discovery prospect is 3 miles west of Rosener oil field and 3 miles south of oil production and shut in gas production in Adams' Muddy Creek field.

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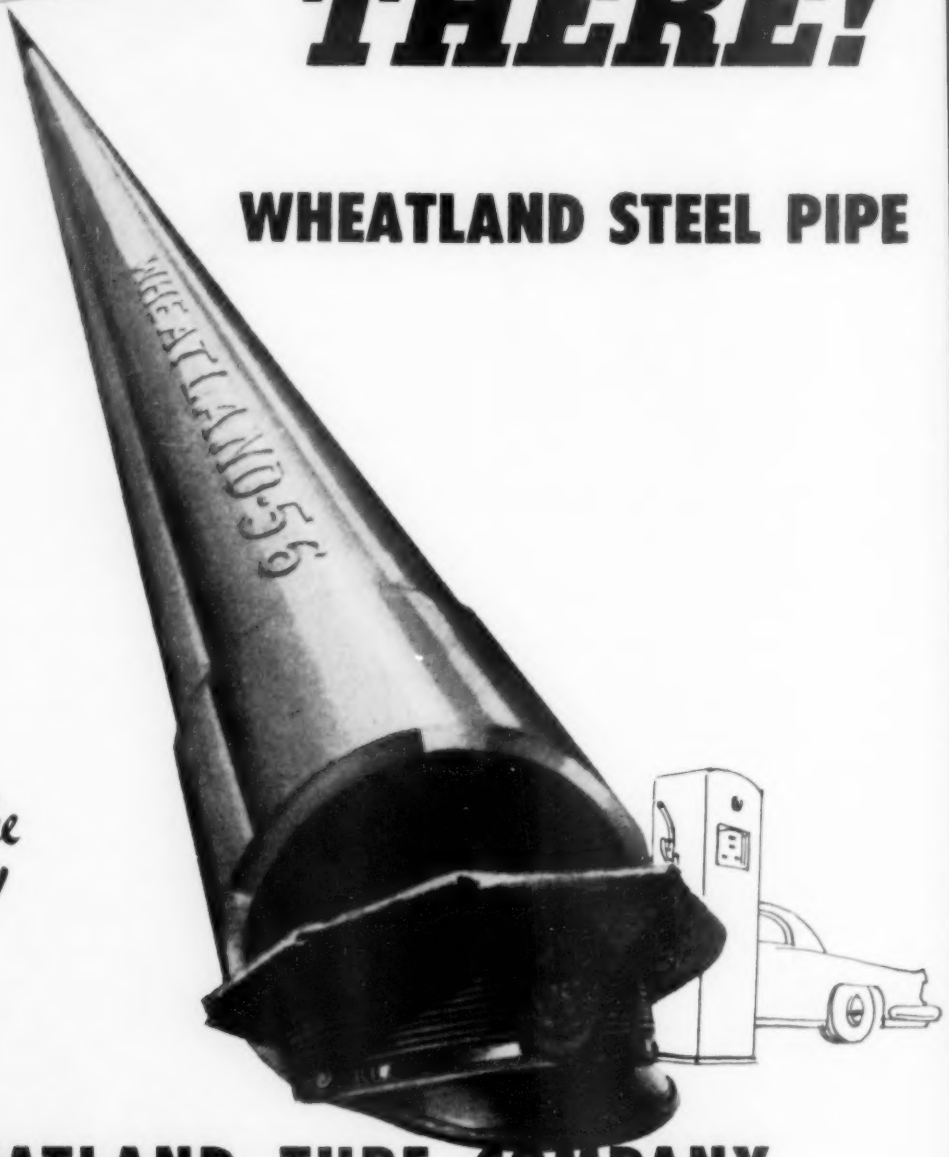


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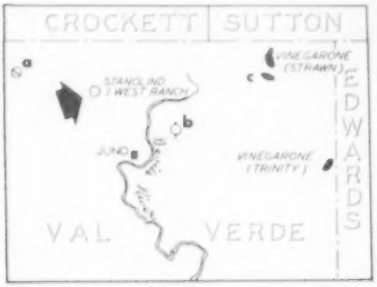
Trust Co., wildcat, ran the 10-in. casing at 1,071 ft. A light show of gas was recorded at 918 ft.

● Young Township, Manufacturers Light & Heat Co. 4336 Stewart and R. & P. Coal Co. is drilling at 424 ft.

## SOUTHWEST TEXAS

### Deep Val Verde Wildcat Scheduled by Stanolind

Val Verde County, in far-southwestern Texas, is getting another deep wildcat test. It will be drilled by Stanolind Oil & Gas Co. on its West Ranch prospect, about 10 miles northwest of Juno, in the northern part of the county. Location is for 1 Wayne West, in Section 4, Block C-16, GS&SF Survey. Hole will be carried to 15,000 ft. for an Ellenburger test.

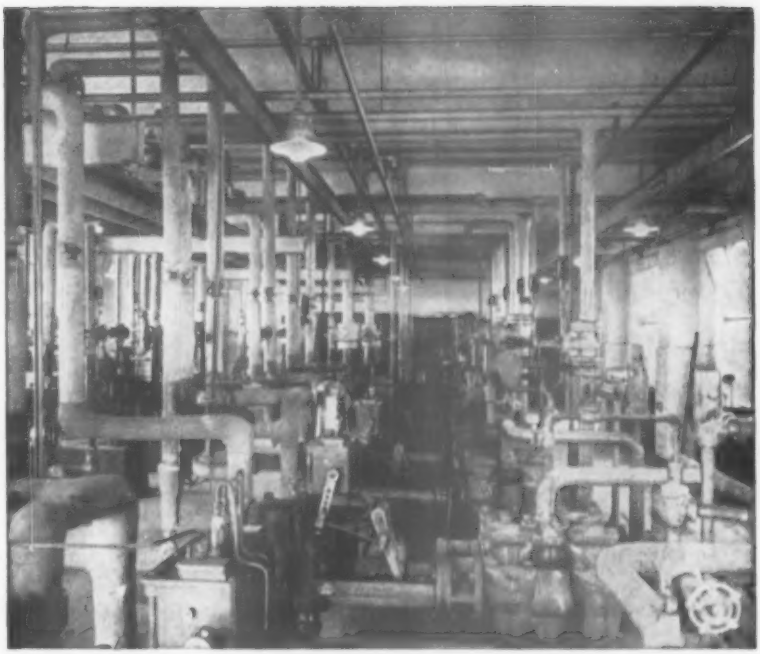



**Portion of northern Val Verde County showing location (arrow) of Stanolind Oil & Gas Co.'s new deep wildcat test. Also indicated are: (a) Magnolia Petroleum Co.'s deep-drilling wildcat; (b) Delta Gulf Drilling Co.'s temporarily abandoned deep test; and (c) Vinegarone extension area where Humble Oil & Refining Co. is on its second deep test.**

This is the sixth deep test to be started or completed this year in this previously little-explored county, all in the northern part. Currently drilling are Magnolia Petroleum Co. at 1 Morrison, in Block O-4, TCRR Survey 10, about 10 miles northwest, and Humble Oil & Refining Co. in the new extension area of the revived old Vinegarone field, more than 20 miles northeast.

Magnolia's test is coring below 15,050 ft. Humble's is its second in the Vinegarone area. Its first was completed in October as a gas well in the area's Pennsylvanian-Strawn sand, with pay at 10,331-91 ft. Its drilling followed the completion last February by Phillips Petroleum Co. of the extension area's discovery well, productive of gas and condensate with pay at 8,982-10,052 ft. and 10,194-10,262 ft.

The county's other deep test this year was drilled by Delta Gulf Drilling Co. and others at 1-A Cauthorn, in Section

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**"Before using Sargent, 19 hydraulic pumps averaged only 17 days each in this well. The Sargent Rodless Pump is still working efficiently after 426 days"**

Such a margin may seem fantastic, but it's true. Actual well records show that 19 other hydraulic pumps averaged only 17 consecutive days each before having to be pulled and serviced. A Sargent Rodless Hydraulic Pump in the same well has continued uninterrupted operation at top pumping efficiency for 426 consecutive days *and is still operating*. That's the type of impressive performance that places the Sargent Rodless Pump in a class by itself. These same records show that this particular pump and hydraulic unit had an efficiency of 98% at the hydraulic engine and 92% at the pump. This unit has proved the best method of pumping oil and performs equally effectively in any type of well. This is not an exceptional case. In field after field, under widely varied well conditions, records prove Sargent lifts more oil at lower cost per barrel. Regardless of your pumping requirements, it will pay you to check the features and advantages that enable the Sargent Rodless Pump to get you more oil at lower cost. *Write today for complete details.*

### CHECK THESE FEATURES:

The Sargent Rodless Hydraulic Pump places the long-stroke unit at the bottom of the well, where it is operated hydraulically without the need for sucker rods. Rod problems and tubing wear are thus entirely eliminated. Energized by crude oil under pressure (furnished by any suitable prime mover located at the surface), the pump requires minimum operating pressure for a given pumping depth and production capacity. Plunger bumping up and down is eliminated because the unit cannot overstroke or understroke. Pump valves are accurately spaced during assembly in the shop. The close spacing and long pump strokes yield the ultimate in gas compression ratio, thus reducing gas lock difficulties.

The pump unit can be surfaced merely by turning a valve and generally can be serviced right at the well. More than twenty Sargent Field Stores furnish standard Sargent API parts and pump service in the field.

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—U.S. Supreme Court

BUILDS PUMPS THAT BUILD GOOD WILL

109, Block E, GC&SF Survey, about 5 miles northeast of Juno. It was abandoned temporarily last October at total depth of 10,043 ft.

## GULF COAST

### TEXAS GULF COAST

### Shallow Gas Production Opened at Smith Point

A relatively shallow gas-productive reservoir is being opened by Humble Oil & Refining Co. in Galveston Bay, just off Smith Point. The discovery well, 69-A State, in tract 137, is just inside Galveston County 1 mile southeast of Smith Point, field, in Chambers County. It is rated good for 28,000,000 cu. ft. of gas per day, open-flow. Shut-in pressure is 1,435 psi. Its Miocene pay is perforated at 3,390-3,400 ft. Smith Point field is productive of oil, condensate, and gas from multiple sands below 8,100 ft. Humble's well was drilled to 11,835 ft., and plugged back to 3,450 ft.

### Wharton County Wildcat Opens New Producing Area

A new producing area is being opened on the Boatwright prospect, 3½ miles northwest of East Bernard, in Wharton County. Discovery is by Robert H. Merritt and Harry Hurt at their 1 Henry Sklar, in the Richard Boatwright Survey, which flowed gas and condensate during initial tests of sand at 7,714-24 ft. Gas flow through ¼-in. choke was estimated at 3,000,000 cu. ft. per day with pressure of 2,000 psi. No estimate was made of liquid yield. Through 5/32-in. choke flowing pressure increased to 2,350 psi.

Location is 2¼ miles west of production in East Bernard field, and about the same distance northwest of West Bernard field.

### New Pettus Oil Discovery Indicated in Bee County

W. G. Darsey, Jr., and Pyramid Drilling Co. have an indicated Pettus-sand oil discovery in southern Live Oak County, near the Jim Wells County line. It is in their 1 Mary Reynolds, 1 mile northwest of Southwest Ramirena field, which, in a 15-minute drill-stem test of its prospective pay at 4,852-59 ft., filled 140 ft. with pipeline oil and 10 ft. with oil-cut mud. Test was through ¼-in. chokes with working pressure of 400 psi., and bottom-hole pressures of 775 to 660 psi., flowing and 2,015 psi., shut-in.


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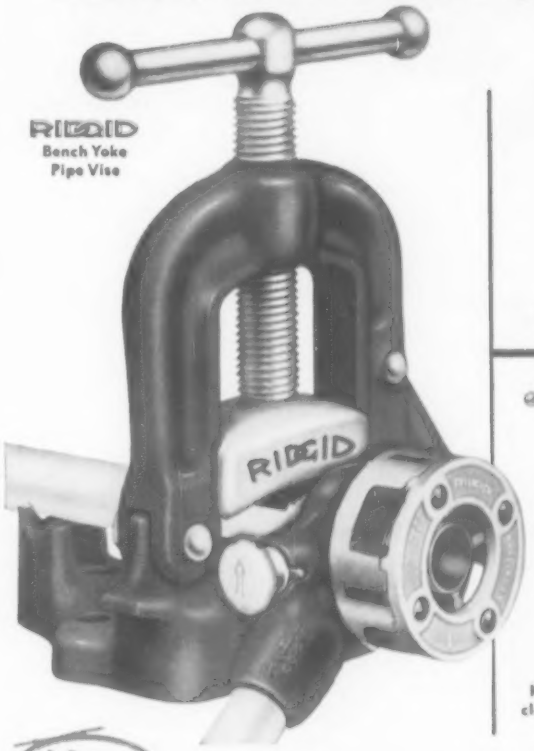

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**SOUTH LOUISIANA**

## Second Well Confirms Grand Coteau Discovery

Columbian Carbon Co. is confirming its discovery last July of production in the Grand Coteau area, southern St. Landry Parish, by completion of its second well, located 1,750 ft. southwest of its discovery well.

The confirmation well, 1 Therese Chatrain, flowed at the rate of 230 bbl. of condensate per day with an estimated 2,500,000 cu. ft. of gas. Flow was through adjustable chokes. Production is from the discovery well's 10,375-ft. sand, through which casing has been run to 10,447 ft. Total depth is 10,521 ft.

The new area is about 3 miles east of the widespread Shuteston field, and about the same distance west and a little north of Ardnaudville field.

## Blow-Out Well Completed On South Kaplan Prospect

Drilling & Exploration Co., Inc., with Harry Hurt, Houston independent, and Crown Central Petroleum Co. as associates, has completed its gas-condensate discovery well on the South Kaplan prospect, 8 miles southwest of Kaplan, in Vermilion Parish.

The well is its 1 Trahan, final completion of which has been delayed because of a blow-out which occurred at the start of production tests last October. Igniting, the well burned out of control for 5 days.

Its open-flow potential is placed at 70,000,000 cu. ft. of gas daily with a condensate yield of 15.04 bbl. per million cubic feet, a gas-liquid ratio of 66,509 cu. ft. per barrel. Production is from a Miocene sand, perforated at 11,152-67 ft. with total depth of 11,188 ft.

Location of the well, in 18-13s-1e, is two miles northeast of East Florence field. It is on a block of 2,480 acres, originally owned by Crown Central, which turned one-third interest each to Drilling & Exploration Co. and Hurt.

## *Successful Wildcats*

**ILLINOIS**

Christian County: L. G. Ewart 1 Davis, NW SE SW 26-14n-3w. IPP 85 BOPD, Devonian 1,796-1,804 ft. TD 1,809 ft. (Opens South Edinburg pool.)

Saline County: C. W. Scott 1 Carter, SE SW NE 32-7s-7e. IPF 164 BOPD, Lower O'Hara 3,011-22 ft. TD 3,150 ft. (South Francismills discovery.)

E. E. Goad 1 Parker, SE SE SW 15-9s-6e. IPP 5 BOPD, Cypress 2,310-29 ft. TD 2,352 ft. (Opens South Harrisburg pool.)

**NORTH LOUISIANA**

DeSoto Parish: Olin Oil & Gas Corp. and

**WEST CENTRAL TEXAS GEOLOGICAL FIELD TRIP—Part of the 129 persons who attended the 1955 Abilene, Tex., Geological Society field trip are shown here. The trip, held December 2, extended for 100 miles from Abilene to near Graham. This picture was taken in Stephens County where the group examined the Waldrip shale. Lecturer at the stop was Dr. George A. Sanderson, with Shell Oil Co. at Midland.**

Crow Drilling & Production Co. et al C-1 Olin, 2½ miles southwest of Elmwood and 5 miles southeast of Mansfield in SW 1-11n-13w. IP 3,000 M.c.f. of gas per day, Paluxy 2,869-75 ft. TD 6,424 ft. (Discovery of East Trenton gas field).

### SOUTH LOUISIANA

Plaquemines Parish: Continental Oil Co. 1-A State Lease 970, Block 45, West Delta Area, Gulf of Mexico. IP 453 BOPD, 9/64 in., 29.9°, perforations 7,313-50 ft. (tubing completion), and 228 BOPD, 9/64-in., 23.9°, perforations 5,746-60 ft. (casing completion). TD 12,315 ft. (New offshore field).

Tide Water Associated Oil Co. 85 Buras Levee, 21-21s-30e. IP 169 BOPD, 5/32-in., 46.8°, perforations 14,928-38 ft. TD 16,416 ft. (New pay in Venice field).

Terrebonne Parish: Ocean Drilling & Exploration Co. 1-A State Lease 1527, Block 67, Ship Shoal Area, Gulf of Mexico. IP 208 BOPD, ⅛-in., 32.2°, perforations 12,137-41 ft. TD 12,175 ft. (New offshore field).

Vermilion Parish: Texas Crude Oil Co. et al 1 Miller, 6-14s-1e. IP 250 BOPD, ½-in., 38.8°, perforations 11,522-26 ft. TD 11,610 ft. (New pay and first oil production in Outside Island field).

### MANITOBA

Canada Cities Service 1 East Max Lake, LSD 14, 29-1-20w1. Mississippian oil well. TD 3,560 ft.

British American-Hudson's Bay 7-26 South Maple, LSD 7, 26-9-26w1. Lodgepole oil well. TD 2,431 ft.

### MONTANA

Hill County: DeKalo Northern Oil Div. 1 Neuworth, C SE NE 18-37n-11e. IPP 1,390 M.c.f. of gas per day, Sawtooth discovery, new field. TD 4,107 ft. Mission Canyon.

### SOUTHWEST TEXAS

Brooks County: Mills Bennett est. 21 Mills Bennett est., Pala Blanco Ysidora Guerra Grant, A-258. IP 123 BOPD, ⅛-in., 45.2°, perforations 5,256-60 ft. ("G" sand). TD 6,265 ft. (New pay in Mills Bennett field).

Duval County: Killam & Hurd 1 Juan Benavides, Block 10, El Mesquite & Carpenter Subd. IP 95.26 BOPD, P-34 choke, 41.8°, perforations 3,289-93 ft. TD 3,295 ft. (Discovery well of Thanksgiving field).

McMullen County: Producers Corp. of Nevada and Henderson Coquat 1 Dickinson, G. B. Dilworth Sur. 24, Lot 48. IP 15,000 M.c.f. daily, open-flow potential, dry gas, perforations 11,419-11,556 ft. (Edwards lime). TD 11,560 ft. (New field).

### SOUTHEAST NEW MEXICO

Lea County: Signal Oil & Gas Co. and Standard Oil Co. of Texas 1 Gulf-State, 4-16s-38e. IP 390 BOPD, ¼-in., TP

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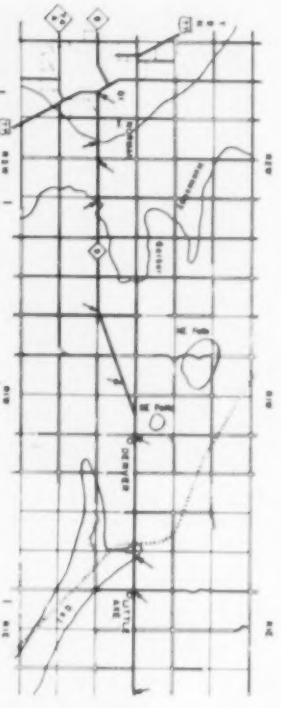
# Highway Geology of Oklahoma Treated In a New Guide Book

000.0 (185.5) Norman. Junction U.S. 77 and State 9. On Quaternary terrace deposits.
001.2 (184.3) Contact of terrace deposits and Hennessey shale (Permian).
001.7 (183.8) To east note line of timber marking boundary between Hennessey shale and oak-covered surface of Garber sandstone.
002.7 (182.8) Contact of Hennessey shale and Garber sandstone (Permian). The Garber is the reservoir from which Norman obtains its water supply.
005.9 (179.6) Crossroad. Barite rosettes in Garber sandstone in ditch south of State 9.
007.0 (178.5) NE Falls Field. Following its discovery early in 1955, four producing wells were completed by August, 1955. Initial production rates ranged from 120 to 965 barrels per day. Production is from the Second Wilcox (Bromide) sand at depths near 7,100'.
007.7 (177.8) Little River. Note deep narrow channel. See "Rivers of Oklahoma" in the introduction.
009.1 (176.4) Denver.
012.2 (173.3) Hog Creek.
013.2 (172.3) Little Axe.
015.6 (169.9) Channel deposits exposed in roadcut.
017.7 (167.8) Cleveland-Pottawatomie County line.



**"Highway Geology of Oklahoma," a 172-page guide book covering the major highways of the state, is now available. The above section of the book is State 9, Norman to Arkansas line.**

The Oklahoma City Geological Society in cooperation with the Oklahoma Geological Survey and the University of Oklahoma have published "Highway Geology of Oklahoma," a 172-page guide book covering the major highways of the state. The highway guide is one of those rare efforts that is designed for both the uninitiated and the technically trained.

Three introductory articles orient the reader with regard to Oklahoma's geology, geography, and history. The article on geology is of necessity brief, but covers the major geologic features and the history of their development. Complete and detailed road logs are included for the major highways, and these are illustrated with strip maps (see cut this page). These strip maps show the surface geology and oil fields. They are keyed to the printed road logs that describe the important features crossed by the road.

"Highway Geology of Oklahoma" is available from the Riley Reproductions, Inc., A & E Equipment Co., Triangle Blue Print Co., Universal Blue Print Co., American-First Title & Trust Co., all in Oklahoma City.

---

1,380 psi., GOR 1,270, 46.7°, top Devonian 13,034 ft., perforated 13,110-60 ft. Elev. 3,760 ft.

### WEST TEXAS

Crockett County: Oliver & Cowden 1 Johnson, Sec. 48, Blk. UV, GC&SF, 20 miles NW Ozona. IP calculated 19,000 M.c.f. gas, pay 1,190-1,215 ft. TD 1,215 ft.

Runnels County: Humble Oil & Refining Co. 1 Moller, J. J. McHenry Sur. 508, 2 miles E Rowena. IP 454 BOPD, ¾-9n., TP 440 psi., GOR 135, 46.6°, Capps lime 3,718-30 ft. TD 3,730 ft. Top Capps lime 3,720 ft., elev. 1,745 ft.

Scurry County: T. J. Hodge 1 Shannon estate, 337-97-H&TC, 9 miles NW Snyder. IPP 78 BOPD, 37°, GOR 260, Clorieta 2,785-91 ft. TD 2,811 ft.

Tom Green County: Lone Star Producing Co. 1 Stansberry, 55-25-H&TC, 9 miles SE Christoval. IP 96.6 BOPD, ¼-in., TP 540 psi., GOR 3160, 32°, Strawn sand 5,170-80 ft. TD 6,056 ft. Elev. 2,315 ft.

### TEXAS GULF COAST

Bee County: Michel T. Halbouty 2 Borroum, Anne Burke Sur., A-5. IP 25,100 M.c.f. daily, open-flow potential, dry gas, perforations 2,752-55 ft. TD 4,306 ft. (New field—Pat Burke).

Galveston County: Sun Oil Co. 2 Humphreys, Reuben Barrow Sur., IP 81 BOPD, ⅛-in., 25.1°, perforations 3,932-44 ft. TD 7,895 ft. (New pay in Caplan field).

Goliad County: 4th M. E. Andrews, Ltd., 1 Gantt et ux, Joseph Callahan Sur., A-87. Shut-in gas well, no gage, perforations 5,370-80 ft. (Cook Mountain). TD 5,465 ft. (New field).

Jefferson County: Magnolia Petroleum Co. 4-A Texas Gulf, Large Tract 10, High Island area, Gulf of Mexico. IP 26,000 M.c.f. daily, GLR 156.5 M.c.f. per bbl., perforations 7,731-46 ft. TD 11,489 ft. (New pay in High Island Block 10-L field.)

Live Oak County: Kirkwood & Co. 1 Thorell, Thomas Pugh Sur., A-34. Shut-in gas well, no gage, perforations 8,054-71½ ft. (Wilcox). TD 8,615 ft. (New field).

Montgomery County: Sinclair Oil & Gas Co. 3 A & M College of Texas, A. W. Springer Sur., A-490. IP 73.5 BOPD, 5/32-in., 41.4°, perforations 5,626-28 ft. TD 6,195 ft. (New pay, extension, and first oil production in Springer field).

### NORTH TEXAS

Archer County: Bridwell Oil Co. 1 Koetter, 66-2-Clark & Plumb, 3 miles SE Windthorst. IP 58 BOPD, 12/64-in., TP 150 psi., 40.5°, GOR 310, pay 4,420 ft. TD 4,442 ft.

D. H. Byrd 1 Vieth, Lot 59, Blk. 3, Clark & Plumb, 2 miles SE Scotland. IP 143 BOPD, 22/64-in., TP 125 psi., 40° GOR 670, Strawn 4,946-56 ft. TD 4,960 ft.

Clay County: L. T. Burns 1 Crump, Blk. 45, Grayson CSL, A-156, 1½ miles NE Bluegrove. Old well re-drilled. IP 133 BOPD, 24/64-in., TP 220 psi., 44°, GOR 677, pay 5,882-98 ft. TD 6,311 ft. Old TD 6,315 ft.

Cooke County: L. W. Hillyer & Paul McCormack 1 Embry, E. A. Williams Sur., A-1111, 8 miles NW Muenster. IPP 93 BOPD, 40°, GOR 200, pay 2,394-2,409 ft. TD 2,440 ft.

Wise County: Christie, Mitchell & Mitchell 1 Hutcheson, R. Coleman Sur., A-155, ½ mlie SE Bridgeport. IP 1,590 M.c.f., plus 15 bbl. distillate per 1,000 M.c.f., conglomerate 5,441 ft. TD 6,070 ft.

# PERSONALS

### *A new honor for Kalichevsky . . .*

## . . . Magnolia's Master Chemist

A RUSSIAN military expert escapes to America. Without previously knowing a word of English, he completes college work for an engineering degree in 3 years. His unusual talents subsequently win him a rank as a leader in American men of science.

The capper to this exciting career came this month in Houston. The American Chemical Society at its eleventh regional meeting there presented its 1955 Southwest Award with this inscription:

"To Vladimir Anatole Kalichevsky, for exceptional achievement . . ."

Kalichevsky is a consulting chemical engineer with Magnolia Petroleum Co. at Beaumont. He is a technical author of note with five books and more than 50 articles carrying his by-line. He has developed many petroleum refining tests and processes and has been awarded 16 patents.

Some of Kalichevsky's work has received national and international recognition. This includes Thermofor catalytic cracking, continuous wax moulding, and the Dualayer gasoline and distillate treating processes.

**Yeast in the bread . . .** But there's no way to measure Kalichevsky's real worth.

His influence is felt in laboratories and offices throughout the oil industry because of the inspiration he has been to young engineers and chemists. He has dispensed technical counsel to these newcomers over the years. He has imbued them with his basic philosophy and inquiring mind.

The dividends are still coming in. Remember this the next time you see a technical article with this simple acknowledgment: "The authors are indebted to V. A. Kalichevsky for helpful criticisms and suggestions."

**Officer of the Czar . . .** Kalichevsky is a product of Czarist Russia and a refugee from the Communists.

He was born in Tiflis in the Russian Caucasus in 1895. He attended the Corps of Pages, equivalent to West Point, and was graduated first in his class as a lieutenant of the Imperial Guards. He studied 3 more years at the Russian War College and was graduated in 1917 with a doctor of military science.

"Kali" did a short tour as a military college lecturer and military attache and closed out his military career with

the White Russian Army in Siberia in 1919-1920. When the Communists triumphed, he fled to Tokyo. There he hired out as manager of the topographical department of Chukotah Peninsular Mining Corp.

**New doors open . . .** The young expatriate landed in the United States a year later, unable to read or write English and just barely able to understand the language.

Yet Kalichevsky enrolled at California Institute of Technology and in 3 years was graduated with a bachelor of science degree in chemical engineering.

His first job was with Union Oil Co. as a research chemist. He stayed there until 1929 when he joined Standard Oil Development Co. (now Esso Research & Engineering Co.) and in 1931 became section supervisor of the research and development department of Socony-Vacuum Oil Co. (now Socony-Mobil). He became general supervisor for them in 1937 and in 1944 assumed his present position with Magnolia.

Kalichevsky's professional interests have run high. He holds memberships in A.I.Ch.E., A.P.I., American Academy of Science, Texas Academy of Science, and the American Association for Advancement of Science. He is listed in American Men of Science, Who's Who in Chemistry, Leaders in American Science (one of nine outstanding leaders from the petroleum industry), and Builders of the Chemical Century (one of ten from the oil industry).

His books include: "Chemical Refining of Petroleum," "Modern Methods of Refining Lubricating Oils," "The Amazing Petroleum Industry," "From Oil Well to Engine," and a forthcoming "Petroleum Refining With Chemicals."

**Champion of science . . .** Kalichevsky still has spare time. He has two historical books to his credit and is working on another.

From all his success and honors, his family life—a wife and daughter—Kalichevsky has gained a great appreciation for America. His big concern: "We don't appreciate what we have."

Kalichevsky also stands as a champion of the technical man. Industry thinking, he says, continually must be geared to provide incentive for the searching mind. Company management must live with the technical man through a period of adjustment. Both will profit by it, he believes.

**Arthur B. Lawrance, Jr.,** has been named a director of Caltex Trading & Transport Co., Ltd., Caltex (U.K.), Ltd., and Caltex Lubricants, Ltd., London.

**S. A. Hallberg,** products pipeline division superintendent at Minneapolis and St. Paul for the supply and transportation division of Standard Oil Co. (Ind.), has been named temporary Chicago division superintendent. Hallberg relieves **R. T. Scott** who is convalescing. **N. F. Tietze,** former district superintendent for the firm at Spring Valley, Minn., now fills the Twin Cities post.

**Niles R. Faulk** has been named head of the geological department of Louisiana Land & Exploration Co.

**Wendell B. Barnes** has been promoted from office manager to assistant division manager in Tulsa of Climax Molybdenum Co.'s water flood division. **M. Lee Hagen,** Nowata, Okla., assistant district superintendent, has been named superintendent. Hagen succeeds **L. H. (Lou) Warwick,** Nowata, who retired recently. **Joseph C. Vaughn,** former field engineer in Stanolind Oil & Gas Co.'s Tulsa research department, has joined Climax's water flood division as chief engineer.

**William C. Krafve** has resigned as geologist for Mobil Producing Co. at Casper to reopen a San Antonio consulting office.

# PERSONALS

## Black Will Head Dallas Petroleum Engineers

**J. W. Black, left, Magnolia Petroleum Co., will preside at the Petroleum Engineers Club of Dallas during 1956. Other new officers are, left to right from Black: Kenneth W. Anderson, U. S. Bureau of Mines, first vice president; R. A. Minter, Lone Star Gas Co., second vice president; H. C. Brand, Schlumberger Well Surveying Corp., third vice president; and G. E. Roark, James A. Lewis Engineering, Inc., secretary-treasurer.**

**Edward J. Massaglia,** former vice president and director of Pfizer International, Inc., has joined Atlas Powder Co. as assistant general manager of the chemicals division.

**Donald J. Monroe,** Tallahassee, Fla., and **Lee C. Smith,** Midland, Tex., have been named assistant regional geologists in Sun Oil Co.'s Southwest production division. Monroe will help supervise Sun's Tyler, Tex., Shreveport, and Tallahassee divisions. Smith will remain in Midland and will help direct work in the Texas Panhandle, West Texas, and southern New Mexico. Other Sun changes: **Rex Alcorn,** named district geologist at Roswell, N. M., succeeding **Edward B. Wilson,** who will retire December 31; and **Walter L. Erwin,** named district geologist at Tallahassee.

**Richard W. Manry** has been promoted by Anderson Prichard Oil Corp. from petroleum engineer at Oklahoma City to district foreman at Midland, Tex.

**Herschel E. Zirger,** formerly a drilling engineer with Ohio Oil Co. at Sidney, Neb., has joined Arabian American Oil Co. as a petroleum engineer in Aramco's New York office.

**Laurence B. Gibson,** Canadian operations vice president for Jupiter Oils, Ltd., has been reelected a director of Edmonton Pipe Line Co., Ltd. Gibson represents Jupiter's 20 per cent interest in the pipeline firm.

**John W. P. Hall,** for 33 years associated with Osage Indian oil and gas leasing at Pawhuska, Okla., will retire January 1. Hall came to the Osage agency in 1922 as assistant gas inspector. Since 1950 he has been chief of the field section, branch of minerals.

**Henry Groppe,** former assistant director of development for Monsanto Chemical Co.'s plastics division, Texas City, Tex., has joined Joseph R. Mares, Houston, as an industrial chemical consultant. Before joining Monsanto, Groppe was with The Texas Co. and Arabian American Oil Co.

**Alfred Neenan,** former superintendent of Belmont Quadrangle Drilling Corp., Bradford, Pa., has joined Petroleum Exploration, Inc., as assistant superintendent at Lexington, Ky.

**Olin Culbertson,** Texas Railroad Commission member, has been named to the Committee on Cooperation between state and federal governments.

**Almer F. Childers,** a director of Toklan Royalty Corp., Tulsa, since June, has been named executive vice president. A well known Mid-Continent and Gulf Coast geologist, Childers recently has been advisor to Cecil Hagen, Gulf Coast producer. He resigned in 1951 as staff geologist for joint operations with Gulf Oil Corp. after 23 years with that firm.

**R. R. Simonson,** geologist in Ohio Oil Co.'s Los Angeles division, has been moved up to division geologist. He succeeds **R. G. Kurtz,** who is on a special assignment. Simonson has been with Ohio at Los Angeles since 1942. Kurtz, a veteran of 28 years with the firm, has been district geologist at Marshall, Ill., and San Antonio.

**A. C. Grant,** Scurlock Oil Co. production superintendent, has been moved from Rising Star to Sweetwater, Tex., to head the firm's enlarged district there.

**H. O. Beadle** and **E. E. Peterson,** both of Newcastle, Wyo., are forming a new Denver company to consolidate interests of several smaller firms operating in Wyoming's Clareton field and San Juan County, Utah. The new firm, Wycotah Oil & Uranium, Inc., will exchange common stock for oil, gas, and uranium interests in Wyoming, Colorado, and Utah.

**Wilford Lee Stapp** has resigned as district geologist for Sunray Mid-Continent Oil Co. at Corpus Christi to join **William J. Seidl,** New Orleans, as a consultant. Stapp had been with Sunray Mid-Continent 10 years. Seidl, formerly with Kerr-McGee Oil Industries, Inc., has been an independent since 1953.

**James C. Johnson** has been promoted by the Asphalt Institute from Oklahoma district engineer to staff engineer in the Institute's College Park, Md., headquarters.

**G. A. Bell** has resigned from Sinclair Oil & Gas Co.'s geophysical department at Fort Worth to join Payne & Warren, Fort Worth consultants. Bell had been with Sinclair 5 years.

**Earl G. Bateman,** Shreveport drilling contractor and operator, and **William C. Kneale,** general manager of Devon-Leduc Oils, Ltd., have been elected directors of Rimrock Tidelands, Inc., Shreveport. Bateman operates E. G. Bateman Drilling Co. and Bateman Oil & Gas Co. Before his retirement in 1952, Kneale was manager of The Texas Co.'s South Texas division. Other directors named by Rimrock: **Justin R. Querbes, Jr.,** Shreveport financier; and **Howard Sober,** Lansing, Mich., motor transport executive. Rimrock is a producer and developer of oil and uranium.

# PERSONALS

**John E. Black,** San Francisco, has been made president of California Crude Sales Co., new Standard Oil Co. of California subsidiary formed to market foreign crude. The new firm will operate on a world-wide basis, centralizing activities of several other Standard subsidiaries. Black also manages Standard's foreign trade department. Other officers named: **P. A. Best,** Perth Amboy, N. J., vice president and manager; and **A. E. Ojeda,** Rio de Janeiro, vice president.

**Dr. Bernard C. Barton** has been named research and development director of Texas-U. S. Chemical Co., jointly owned by The Texas Co. and United States Rubber Co. Barton formerly headed the rubber applications and synthetic-rubber research departments of U. S. Rubber's general laboratories. In his new post he will direct research and development of petrochemicals and synthetic rubber.

**L. E. J. Brouwer,** general managing director of Iranian Oil Exploration & Producing Co. and Iranian Oil Refining Co., will leave Teheran about March 31 to rejoin the Royal Dutch-Shell group. **K. Scholtens,** now a senior executive in the main Netherlands operating subsidiary of Royal Dutch-Shell, will succeed Brouwer.

**Jack C. Dart,** general manager of the chemicals division and a director of Houdry Process Corp., and **Dr. Alex G. Oblad,** Houdry's research and development manager, have been named vice presidents. Oblad also was elected a director. Dart, former research and development manager, holds patents in alkylation, hydrocarbon synthesis, and cat cracking of petroleum fractions. Oblad holds more than 20 patents in catalysis.

**Roy B. Ralston** has joined Phillips Petroleum Co. as district land and geological manager at Evansville, Ind. Ralston has 15 years' geological and production experience in the Evansville area. He recently held a farm implement dealership in Olin, Iowa.

**Robert Q. Russell** has been promoted by Gulf Oil Corp. from field production engineer at Oklahoma City to water flood engineer at Tulsa.

**James A. Seglund** has resigned as district geologist for The Texas Co. at Layfayette, La., to join Tom Rodgers in forming a consulting geological and engineering firm, Rogers & Seglund. The new firm is headquartered in New Orleans.

**Castle J. Harvey,** chief geophysicist for Texas Pacific Coal & Oil Co., Fort Worth, since 1953, will be assistant exploration manager January 1. Harvey will be succeeded by **Paul C. Reed,** now geophysicist for Forest Oil Co. in Midland, Tex. Before joining Texas Pacific, Harvey was active in exploration for Amerada Petroleum Corp., Atlantic Refining Co., and Deep Rock Oil Corp. Reed has been with Forest since 1950. His previous work was with Carr Geophysical Corp., Century Geophysical Corp., and Gulf Research & Development Co.

**Claude E. (Speedo) Swift,** vice president of research and process for Union Oil Co. of California, has retired after nearly 30 years with the firm. Swift joined Union in 1926 as a research chemist. In 1947 he was named vice president of research, development, patents, and process. In 1952 he became a director of Brea Chemicals, a Union subsidiary.

**Gus Athanas** has been promoted by Standard Oil & Gas Co. from senior petroleum engineer to district engineer at Lubbock, Tex. Athanas replaces **E. H. Blackaller,** who resigned recently.

J. F. CHACE

**J. Fletcher Chace,** Tide Water Associated Oil Co. executive, has been named a vice president and director of Mitsubishi Oil Co., Ltd., Tokyo. Tide Water owns 50 per cent of the Japanese firm. Chace replaces **Irving E. Chapman,** who is rejoining the Tide Water domestic marketing organization. He continues as a Mitsubishi director.

**Stanley C. Hope,** president of Esso Standard Oil Co., has been named vice president for 1956 of the National Association of Manufacturers' eastern division.

**Frank L. Emert,** assistant manager of Lion Oil Co.'s El Dorado, Ark., refinery, will head a new engineering section in the firm's manufacturing department. Another new section, development, will be directed by **John A. Sherred,** now research development director for Monsato Chemical Co.'s plastics division in St. Louis. Lion also has elevated **H. Harold Bible** from assistant manager to director of manufacturing. Emert joined Lion in 1940 and has been active at El Dorado refinery and chemical plant since. Sherred has been with Monsato since 1947. Prior to the St. Louis post, he headed development at the firm's Texas City plant.

# DEATHS

**Percy Norman Furber,** an industry pioneer, died December 15 at his home in Darien, Conn. He was 90. Furber was credited with drilling Mexico's first well.

**Walter D. George,** 76, retired independent who launched his career in 1901 during the Spindletop boom, died recently in Shreveport. George was a past president of the Louisiana-Arkansas division of the Mid-Continent Oil and Gas Association. He retired in 1950.

**Dr. Laurence F. Athy,** 57, former Continental Oil Co. exploration manager, died December 17 in Giddings, Tex. Athey joined Conoco in 1925. He became manager of the firm's geological division in 1948, and exploration manager in 1951. Ill health forced his retirement earlier this year.

**Paul H. Reisher,** who retired in 1954 as chief geologist for Gulf Oil Corp.'s Tulsa division, died December 22 in Tulsa. He was a Gulf employe 42 years.

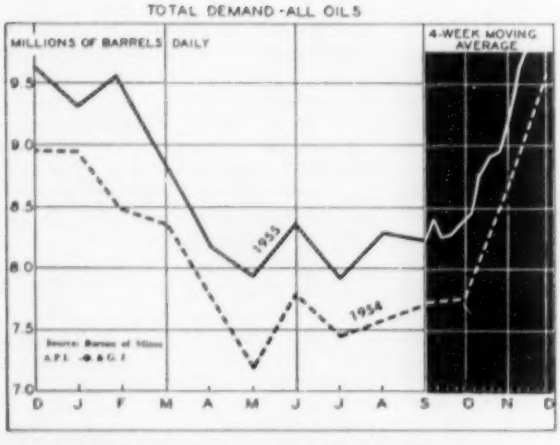
**Fred A. Keup,** 75, retired Montana independent, died recently in Shelby, Mont. Keup was secretary-treasurer of Dakota Montana Oil Co. from 1930 to 1934, when he joined Arthur Katele in drilling and producing at the Cut Bank field. He retired in 1952.

**W. R. (Frosty) Martin,** 82, pioneer Long Beach area driller and founder of Martin-Decker Corp., died December 14 in Long Beach. Martin was a leader in the Long Beach fight to keep state tidelands. He had retired in 1946 from Martin-Decker, maker of oil well instruments.

# Latest Figures . . . Industry Trends

## A QUICK LOOK AT THE HIGHLIGHTS

| | LATEST WEEK | Change from WEEK AGO | | Change from YEAR AGO | |
|---|---|---|---|---|---|
| Production | 6,947,050 | UP | 38,200 | UP | 549,253 |
| Crude stocks | 256,920,000 | DOWN | 773,000 | DOWN | 8,453,000 |
| Completions | 1,249 | UP | 24 | UP | 81 |
| Refinery runs | 7,684,000 | UP | 66,000 | UP | 458,000 |
| Gasoline stocks | 160,406,000 | UP | 2,032,000 | UP | 8,628,000 |
| Distillate stocks | 126,040,000 | DOWN | 8,373,000 | UP | 7,958,000 |
| Residual stocks | 40,935,000 | DOWN | 1,832,000 | DOWN | 11,330,000 |
| Four-product stocks | 357,290,000 | DOWN | 10,269,000 | UP | 3,229,000 |
| Total imports | 1,292,700 | DOWN | 174,700 | DOWN | 60,200 |




## Cold Weather Causes Scramble for Heating Oils in Some Areas

COLDER-THAN-NORMAL weather in the areas of high fuel demand has caused a mad scramble for light and heavy fuel that borders on mass hysteria. Suppliers report calls from distributors they had not been able to sell for years.

Heavy fuel is causing more trouble than heating distillates. Total primary stocks of residual fuel are down about 10,000,000 bbl. from the December level last year. Preliminary reports indicate that imports of heavy fuel for the last quarter will be at least 7.0 per cent below receipts in the same quarter last year.

In the past 15 weeks, refinery runs have averaged about 8.5 per cent more than in the same weeks last year. However, production of heavy fuel gained only 3.5 per cent or 38,000 bbl. daily. The gain in production at refineries just about offsets the loss in imports, leaving total supply of residual about the same as in the fourth quarter of 1954. Colder weather and increased industrial production have raised the potential demand for resid without a corresponding increase in supply.

Group 3 suppliers raised residual prices again, effective either December 20 or 21. The new low is $1.90 a barrel with reports that customers have offered as much as $0.15 a barrel over this low for immediate delivery. Very little spot material is available at any price.

**Resid is short on East Coast . . .** Heavy fuel is very tight in New York Harbor. A cargo of No. 6 was reported to have been sold in the harbor area at $0.05 a barrel above the low barge price of $2.65.

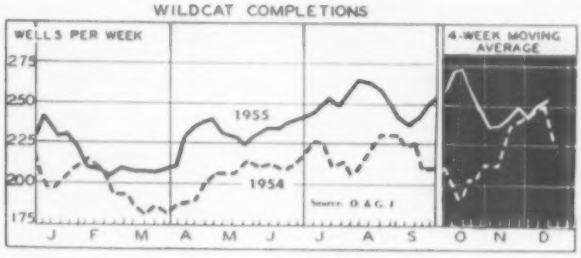
Most suppliers in Philadelphia have met Atlantic Refining Co.'s increase of $0.10 a barrel in postings for residual in the Philadelphia area. If prices hold at the new level, regular-grade resid will sell for the same as postings in New York Harbor but low-sulfur material will be $0.05 above the low at New York.

In all of the principal marketing areas, residual is selling for more than at this time last year. The gain in Group 3 has been $0.45 a barrel, up to $1.90 from $1.45 at this time last year.

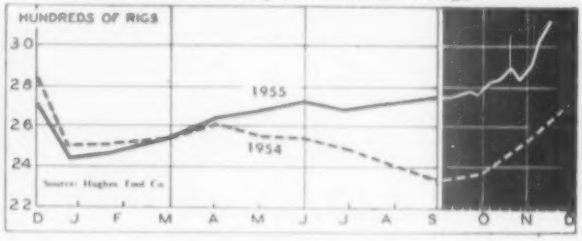
**Group 3 distillate rises . . .** Distillate heating oils moved up another 0.125 cent a gallon on the Group 3 market to bring the No. 2 fuel low to 8.675 cents a gallon. This latest increase put burning-oil prices in line with quotations at this time last year. A continuation of anything like normal weather will add further strength to the market, probably enough to raise prices to match the increases last year. No. 2 fuel sold at 8.875 cents a gallon early in January a year ago.

Grade 26-70 natural gasoline moved up 0.125 cent a gallon on the Group 3 market to 6.0 cents. However, the average for December will be slightly under 6.0 cents since most sales for the first 2 weeks of the month were at 5.875 cents. Since natural prices normally drop either in January or February, and since 6.0 cents is the break point on most gas contracts, there is very little chance that the current price will hold to the end of January.

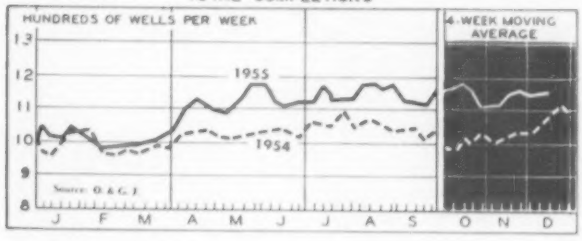
WILDCAT COMPLETIONS




ROTARY RIGS OPERATING IN THE UNITED STATES




TOTAL COMPLETIONS




ACTIVE ROTARY RIGS*

| Area— | 12-19-55 | Change from 12-12-55 | Change from 12-20-54 |
|---|---|---|---|
| Gulf Coast | 700 | 52 | 101 |
| N. and W. Texas-New Mexico | 1,078 | 45 | 187 |
| Arkansas-N. Louisiana-E. Texas | 196 | 1 | —4 |
| Oklahoma | 362 | —13 | 46 |
| Kansas-S. Nebraska | 207 | 8 | 14 |
| Illinois-Eastern | 155 | 12 | 3 |
| Rocky Mountain | 291 | 8 | 40 |
| Pacific Coast | 148 | —4 | —2 |
| Total United States | 3,137 | 109 | 385 |
| Western Canada | 201 | 11 | —10 |

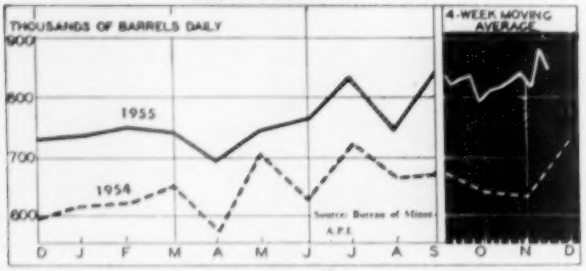
*Hughes Tool Co.

## WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 17, 1955

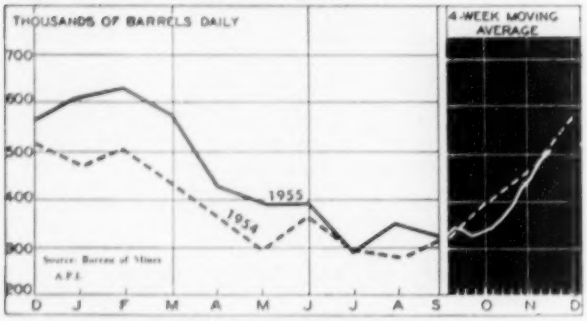
| | Total of all wells: Comp. | Oil | Gas | Dry | Footage | Cum. 1955 | Cum. 1954 | Wildcat completions and discoveries: Oil | Dist. | Gas | Dry | Total | Cumulative total, 1955: Oil | Dist. | Gas | Dry | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala.-Ga.-Fla. | 2 | 0 | 0 | 2 | 14,736 | 71 | 96 | 0 | 0 | 0 | 2 | 2 | 1 | 0 | 0 | 67 | 68 |
| Arkansas | 13 | 7 | 0 | 6 | 32,280 | 792 | 587 | 0 | 0 | 0 | 3 | 3 | 34 | 1 | 4 | 167 | 206 |
| California | 45 | 34 | 2 | 9 | 198,338 | 2,344 | 2,275 | 0 | 0 | 0 | 8 | 8 | 41 | 0 | 12 | 442 | 495 |
| Colorado | 39 | 5 | 1 | 33 | 210,353 | 1,454 | 1,305 | 1 | 0 | 1 | 22 | 24 | 49 | 0 | 24 | 704 | 777 |
| Illinois | 110 | 52 | 1 | 57 | 254,246 | 3,792 | 2,886 | 5 | 0 | 1 | 19 | 25 | 71 | 0 | 6 | 539 | 616 |
| Indiana | 7 | 3 | 0 | 4 | 9,743 | 692 | 850 | 0 | 0 | 0 | 2 | 2 | 11 | 0 | 0 | 248 | 259 |
| Kansas | 102 | 49 | 4 | 49 | 368,871 | 4,849 | 4,398 | 2 | 0 | 0 | 22 | 24 | 132 | 1 | 34 | 825 | 992 |
| Kentucky | 43 | 16 | 6 | 21 | 67,634 | 1,566 | 1,152 | 1 | 0 | 1 | 9 | 11 | 53 | 0 | 11 | 327 | 391 |
| Louisiana | 93 | 55 | 8 | 30 | 687,177 | 3,908 | 3,415 | 5 | 0 | 1 | 11 | 17 | 111 | 80 | 29 | 456 | 676 |
| North | 36 | 19 | 6 | 11 | 116,363 | 2,019 | 1,867 | 1 | 0 | 1 | 5 | 7 | 26 | 11 | 5 | 194 | 236 |
| South | 57 | 36 | 2 | 19 | 570,814 | 1,889 | 1,548 | 4 | 0 | 0 | 6 | 10 | 85 | 69 | 24 | 262 | 440 |
| Michigan | 6 | 2 | 0 | 4 | 21,899 | 503 | 539 | 0 | 0 | 0 | 2 | 2 | 12 | 0 | 1 | 193 | 206 |
| Mississippi | 6 | 2 | 0 | 4 | 54,292 | 439 | 412 | 0 | 0 | 0 | 2 | 2 | 14 | 0 | 0 | 163 | 177 |
| Montana | 11 | 2 | 1 | 8 | 70,113 | 388 | 322 | 0 | 0 | 1 | 6 | 7 | 13 | 0 | 2 | 147 | 162 |
| Nebraska | 33 | 7 | 0 | 26 | 171,111 | 870 | 434 | 0 | 0 | 0 | 18 | 18 | 44 | 0 | 1 | 369 | 414 |
| New Mexico | 46 | 17 | 26 | 3 | 190,688 | 1,650 | 1,075 | 1 | 0 | 0 | 1 | 2 | 40 | 2 | 10 | 120 | 172 |
| Northwest | 28 | 0 | 26 | 2 | 115,064 | 589 | 389 | 0 | 0 | 0 | 1 | 1 | 8 | 1 | 10 | 43 | 62 |
| Southeast | 18 | 17 | 0 | 1 | 75,624 | 1,061 | 686 | 1 | 0 | 0 | 0 | 1 | 32 | 1 | 0 | 77 | 110 |
| North Dakota | 3 | 2 | 0 | 1 | 24,199 | 247 | 296 | 0 | 0 | 0 | 1 | 1 | 7 | 0 | 0 | 61 | 68 |
| Ohio | 30 | 16 | 8 | 6 | 55,537 | 1,176 | 1,117 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 8 | 16 | 27 |
| Oklahoma | 179 | 100 | 6 | *73 | 568,640 | 8,255 | 8,408 | 1 | 0 | 0 | 13 | 14 | 133 | 19 | 27 | 638 | 817 |
| Pennsylvania-New York | 19 | 2 | 12 | 15 | 55,508 | 1,424 | 2,109 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 8 | 11 | 19 |
| Texas | 450 | 285 | 16 | 149 | 1,799,622 | 19,539 | 17,808 | 18 | 1 | 5 | 80 | 104 | 760 | 109 | 129 | 4,004 | 5,002 |
| Southwest (1 & 4) | 73 | 38 | 2 | 33 | 272,079 | 3,014 | 2,474 | 2 | 0 | 1 | 19 | 22 | 115 | 36 | 38 | 761 | 950 |
| Gulf Coast (2 & 3) | 62 | 32 | 6 | 24 | 380,027 | 2,444 | 2,500 | 3 | 1 | 2 | 13 | 19 | 91 | 60 | 43 | 653 | 847 |
| East (5 & 6) | 18 | 6 | 3 | 9 | 98,937 | 962 | 972 | 1 | 0 | 0 | 4 | 5 | 24 | 5 | 10 | 318 | 357 |
| North Central (7-B & 9) | 165 | 94 | 1 | 70 | 481,060 | 7,290 | 6,798 | 9 | 0 | 1 | 35 | 45 | 361 | 0 | 17 | 1,594 | 1,972 |
| West (7-C & 8) | 103 | 93 | 1 | 9 | 472,147 | 4,801 | 4,146 | 3 | 0 | 1 | 7 | 11 | 159 | 1 | 12 | 641 | 813 |
| Panhandle (10) | 29 | 22 | 3 | 4 | 95,372 | 1,028 | 918 | 0 | 0 | 0 | 2 | 2 | 10 | 7 | 9 | 37 | 63 |
| Utah | 1 | 0 | 0 | 1 | 1,534 | 82 | 96 | 0 | 0 | 0 | 1 | 1 | 6 | 0 | 6 | 52 | 64 |
| West Virginia | 0 | 0 | 0 | 0 | 0 | 614 | 594 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 20 | 32 |
| Wyoming | 10 | 4 | 0 | 6 | 52,387 | 860 | 1,183 | 0 | 0 | 0 | 5 | 5 | 25 | 0 | 8 | 211 | 244 |
| Miscellaneous (Idaho) | 1 | 0 | 0 | 1 | 2,338 | 59 | 117 | 0 | 0 | 0 | 1 | 1 | 4 | 0 | 3 | 48 | 55 |
| Total United States | **1,249** | 660 | 91 | 498 | 4,911,246 | 55,574 | 51,474 | 34 | 1 | 11 | 229 | **275** | 1,564 | 212 | 335 | 9,828 | 11,939 |
| Total previous week | 1,225 | 651 | 70 | 504 | 4,567,220 | | | 23 | 9 | 7 | 249 | 288 | 1,530 | 211 | 324 | 9,599 | 11,664 |
| Total December 18, 1954 | 1,168 | 620 | 114 | 434 | 4,616,896 | | | 34 | 1 | 12 | 186 | 233 | 1,437 | 131 | 397 | 8,792 | 10,757 |
| Western Canada | 67 | 42 | 6 | 19 | 328,568 | | | | | | | | | | | | |

Service wells included: *11, 13.

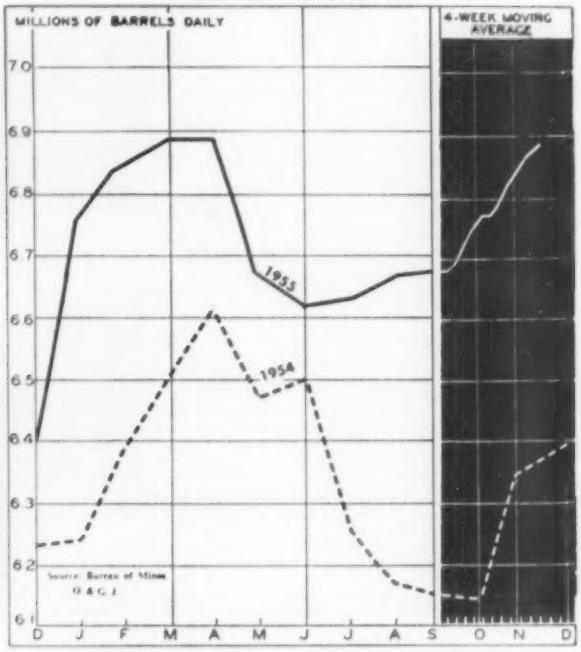
CRUDE IMPORTS




PRODUCT IMPORTS




CRUDE-OIL PRODUCTION

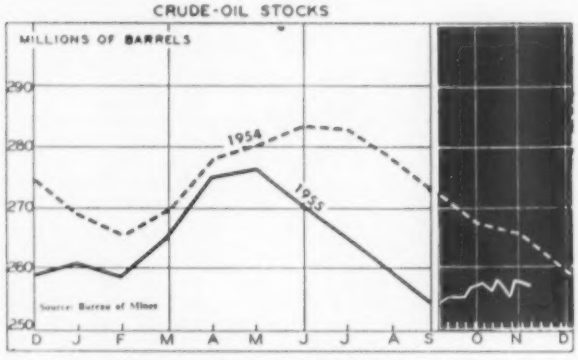



## DAILY AVERAGE PRODUCTION FOR WEEK

| | December 17 — Lease Crude oil | Lease condensate | Total | Dec. 10 total |
|---|---|---|---|---|
| Alabama | 4,100 | | 4,100 | 4,300 |
| Arkansas | 74,350 | 400 | 74,750 | 74,150 |
| California | 978,200 | | 978,200 | 976,400 |
| Colorado | 153,300 | | 153,300 | 146,500 |
| Eastern | 52,100 | | 52,100 | 52,100 |
| Florida | 1,350 | | 1,350 | 1,350 |
| Illinois | 219,800 | | 219,800 | 222,700 |
| Indiana | 29,100 | | 29,100 | 28,000 |
| Kansas | 334,200 | | 334,200 | 335,500 |
| Kentucky | 39,500 | | 39,500 | 41,000 |
| Louisiana | 711,200 | 58,500 | 769,700 | 770,600 |
| North | 113,200 | 2,500 | 115,700 | 116,600 |
| South | 598,000 | 56,000 | 654,000 | 654,000 |
| Michigan | 31,000 | | 31,000 | 30,400 |
| Mississippi | 107,300 | 5,050 | 112,350 | 112,350 |
| Montana | 41,300 | | 41,300 | 39,700 |
| Nebraska | 29,100 | | 29,100 | 27,800 |
| New Mexico | 223,900 | 4,150 | 228,050 | 227,850 |
| North Dakota | 36,700 | | 36,700 | 35,100 |
| Oklahoma | 590,100 | | 590,100 | 566,200 |
| Texas | 2,887,000 | 53,250 | 2,940,250 | 2,940,250 |
| Dist. 1 | 56,000 | 600 | 56,600 | 56,600 |
| Dist. 2 | 154,000 | 8,100 | 162,100 | 162,100 |
| Dist. 3 | 414,000 | 25,200 | 439,200 | 439,200 |
| Dist. 4 | 241,000 | 5,400 | 246,400 | 246,400 |
| Dist. 5 | 49,000 | 525 | 49,525 | 49,525 |
| Dist. 6 | 126,500 | 5,800 | 132,300 | 132,300 |
| East Texas field | 223,500 | | 223,500 | 223,500 |
| Dist. 7-B | 150,000 | 50 | 150,050 | 150,050 |
| Dist. 7-C | 175,000 | 4,800 | 179,800 | 179,800 |
| Dist. 8 | 992,000 | 2,000 | 994,000 | 994,000 |
| Dist. 9 | 216,000 | 575 | 216,575 | 216,575 |
| Dist. 10 | 90,000 | 200 | 90,200 | 90,200 |
| Utah | 4,500 | | 4,500 | 4,600 |
| Wyoming | 277,400 | | 277,400 | 271,800 |
| Others | ‡200 | | ‡200 | 200 |
| Total U. S. | 6,825,700 | 121,350 | **6,947,050** | 6,908,850 |
| Change from previous week up | | | **38,200** | |
| Canada | †429,825 | | †429,825 | †371,600 |
| Total U. S. production Jan. 1-Dec. 17 | | | 2,370,569,950 bbl. | |
| Same period last year (crude plus cond.) | | | *2,226,721,207 bbl. | |

*Includes 34,389,100 bbl. condensate. †Week ended previous Monday. ‡Nov. 200.

CRUDE-OIL STOCKS



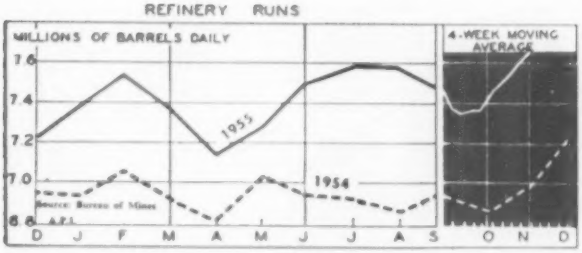

## CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

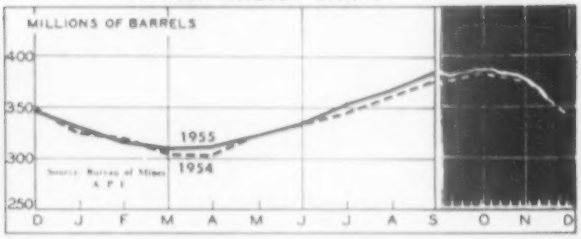
| | 12-10-55 | 12-3-55 | 12-11-54 |
|---|---|---|---|
| Pennsylvania Grade | 3,018 | 2,991 | 3,082 |
| Other Appalachian | 2,253 | 2,117 | 1,893 |
| Illinois, Indiana, Michigan | 9,404 | 9,808 | 12,402 |
| Nebraska, North Dakota | 2,124 | 2,154 | 1,789 |
| Kansas | 7,744 | 7,662 | 8,226 |
| Oklahoma | 21,245 | 21,426 | 25,521 |
| Arkansas | 2,528 | 2,418 | 3,163 |
| Louisiana | 16,358 | 16,797 | 15,543 |
| North | 2,733 | 3,052 | 2,364 |
| South | 13,625 | 13,745 | 13,179 |
| Mississippi | 2,770 | 2,685 | 3,103 |
| New Mexico | 7,658 | 7,447 | 8,053 |
| Texas | 121,356 | 122,053 | 120,340 |
| East Texas proper | 9,094 | 9,549 | 10,209 |
| West Texas | 57,466 | 56,284 | 52,862 |
| Texas Gulf | 24,359 | 25,367 | 24,457 |
| Other Texas | 30,437 | 30,853 | 32,812 |
| Wyoming | 15,141 | 15,007 | 13,374 |
| Other Rocky Mountain | 5,706 | 5,823 | 5,730 |
| California | 27,228 | 26,901 | 31,856 |
| Foreign | †12,387 | 12,404 | 11,298 |
| Total | 256,920 | 257,693 | 265,373 |

*Bureau of Mines. †Includes 2,308,000 bbl. in California.

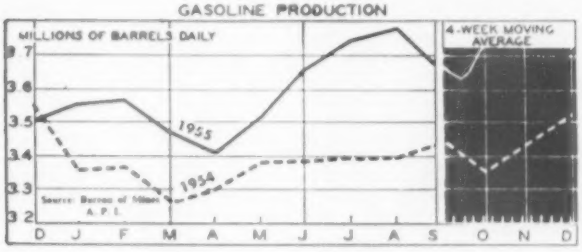
REFINERY RUNS



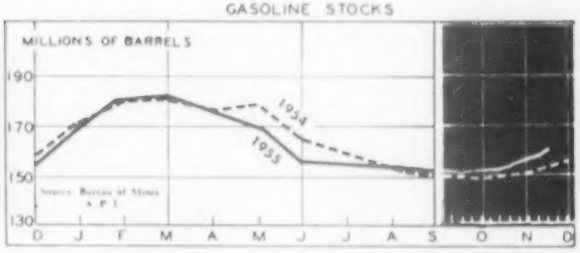

FOUR-PRODUCT STOCKS



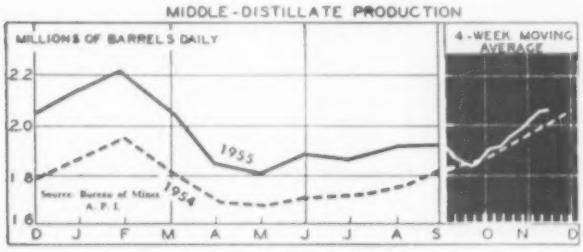

GASOLINE PRODUCTION



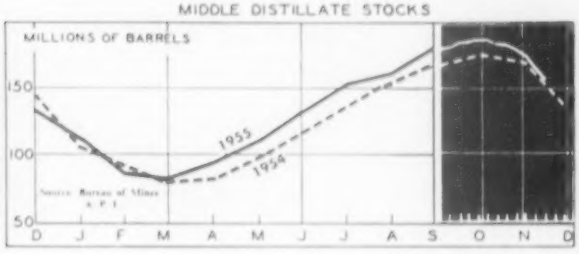

GASOLINE STOCKS



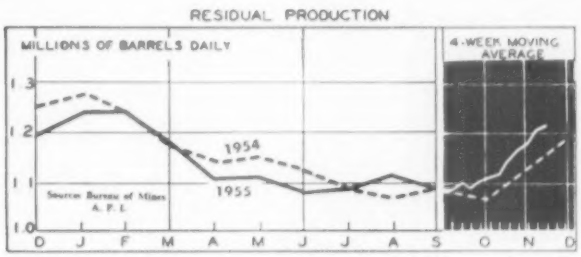

MIDDLE-DISTILLATE PRODUCTION



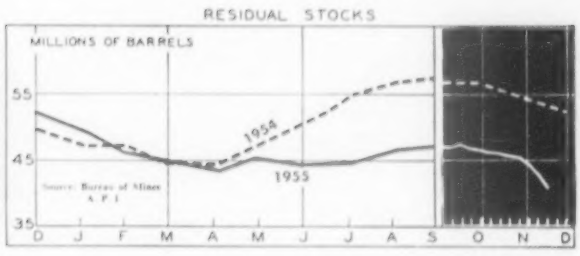

MIDDLE DISTILLATE STOCKS




RESIDUAL PRODUCTION




RESIDUAL STOCKS



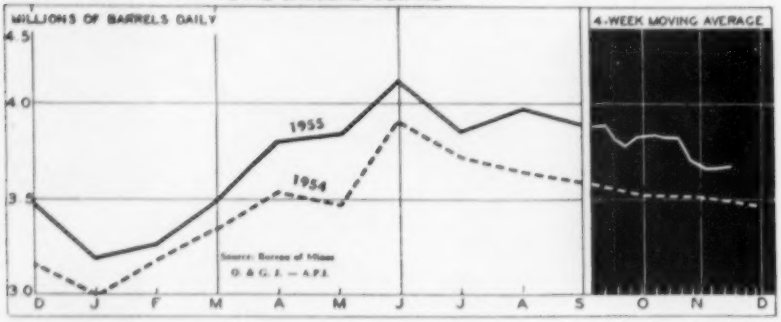

## A.P.I. REFINERY REPORT, DECEMBER 16

(Thousands of barrels)

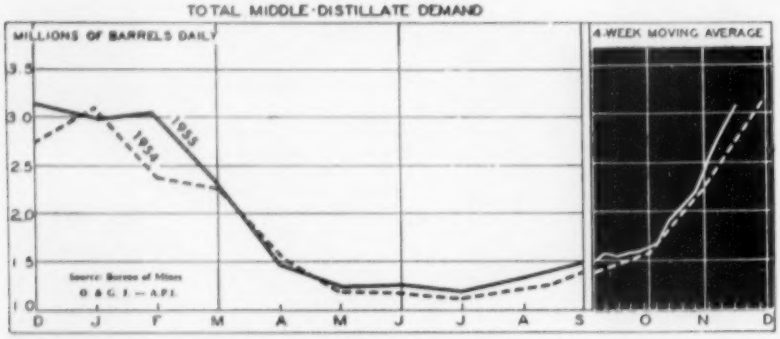
| District— | Daily avg. runs | Daily average production Gaso.* | Kero. | Dist. | Resid. | Stocks† Gaso.‡ | Kero. | Dist. | Resid. | Bureau of Mines, December 1954 Daily avg. runs | Daily average production Gaso.* | Kero. | Dist. | Resid. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Coast | 1,060 | 453.7 | 10.6 | 275.8 | 224.4 | 36,054 | 12,457 | 47,752 | 11,267 | 1,048 | 426.2 | 34.3 | 281.0 | 249.0 |
| Appalachian: | | | | | | | | | | | | | | |
| District 1 | 108 | 43.4 | 6.7 | 23.0 | 8.6 | 4,552 | 640 | 2,638 | 558 | 98 | 40.9 | 6.4 | 20.5 | 9.2 |
| District 2 | 105 | 54.1 | 6.6 | 16.9 | 11.9 | 2,296 | 398 | 918 | 359 | 75 | 36.4 | 6.6 | 13.2 | 9.5 |
| Ind., Ill., Ky. | 1,473 | 780.0 | 85.8 | 296.7 | 219.0 | 33,151 | 7,001 | 21,935 | 3,953 | 1,341 | 716.6 | 78.7 | 278.2 | 186.7 |
| Okla., Kans., Mo. | 732 | 426.7 | 18.7 | 181.3 | 30.3 | 16,398 | 1,666 | 12,951 | 1,440 | 645 | 361.7 | 20.6 | 167.0 | 44.3 |
| Inland Texas | 252 | 195.7 | 5.3 | 54.6 | 22.0 | 5,674 | 550 | 2,484 | 1,323 | 239 | 171.5 | 11.9 | 46.1 | 18.3 |
| Texas Gulf Coast | 1,880 | 897.0 | 134.1 | 478.7 | 257.7 | 21,055 | 3,051 | 14,950 | 6,903 | 1,797 | 835.3 | 139.6 | 468.0 | 226.4 |
| La. Gulf Coast | 679 | 344.6 | 57.3 | 153.6 | 56.8 | 9,248 | 2,618 | 6,089 | 1,361 | 606 | 307.4 | 61.8 | 159.9 | 38.9 |
| N. La. and Ark. | 93 | 36.6 | 8.9 | 19.1 | 7.9 | 4,150 | 800 | 2,432 | 88 | 88 | 35.8 | 9.1 | 20.5 | 7.8 |
| Rocky Mountain: | | | | | | | | | | | | | | |
| New Mexico | 21 | 10.9 | | 3.3 | 2.7 | 253 | 6 | 49 | 29 | 20 | 11.6 | 0.7 | 3.3 | 3.0 |
| Other Rocky Mtn. | 251 | 121.6 | 3.6 | 58.3 | 38.9 | 5,385 | 297 | 2,572 | 760 | 248 | 123.6 | 5.1 | 59.6 | 42.3 |
| California | 1,030 | 502.7 | 9.3 | 164.0 | 351.7 | 22,190 | 425 | 11,270 | 12,896 | 1,033 | 448.4 | 5.7 | 151.0 | 351.9 |
| Dec. 16, 1955 | 7,684 | 3,867.0 | 346.9 | 1,725.3 | 1,231.9 | 160,406 | 29,909 | 126,040 | 40,935 | 7,238 | 3,515.4 | 380.5 | 1,668.3 | 1,187.3 |
| Dec. 9, 1955 | 7,618 | 3,792.3 | 348.1 | 1,694.7 | 1,216.9 | 158,374 | 32,005 | 134,413 | 42,767 | | | | | |
| Dec. 17, 1954 | 7,226 | 3,496.9 | 357.1 | 1,655.3 | 1,116.9 | 151,778 | 31,936 | 118,082 | 52,265 | | | | | |

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

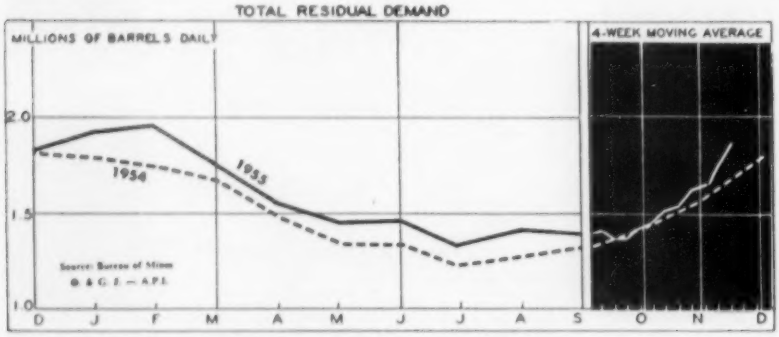
TOTAL GASOLINE DEMAND




TOTAL MIDDLE-DISTILLATE DEMAND




TOTAL RESIDUAL DEMAND




## REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of December 21, 1955. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

### GASOLINE, KEROSINE, AND FUEL OILS

| | Mid-Continent Group 3 | New York Harbor (barge) | Texas Gulf Coast |
|---|---|---|---|
| Regular gasoline | 11-11.25 | 11.75-12 | 10.375-10.75 |
| Premium gasoline | 12.5-12.75 | 13-13.75 | 11.875-12.25 |
| 42-44 w.w. kerosine | 9.625-10.0 | 10.55 | 8.5-9.0 |
| No. 2 straw fuel oil | 8.625-9.0 | 10.05 | 8.25-8.75 |
| No. 6 residual | $1.90-2.05 | $2.65-2.80 | $2.10-2.20 |

### NATURAL GASOLINE

| | Group 3 | North Texas | N. La. |
|---|---|---|---|
| Grade 26-70 | 6.0 | 5.5 | 5.75 |
| Grade 18-55 | 7.2 | 6.7 | 6.95 |

### LUBRICATING OILS

**Mid-Continent**

| | |
|---|---|
| 150-160 vis., D bright stock, 0-10 pp. | 20 |
| 200 vis., No. 3 neutral, 0-10 pp. | 15.25 |

### WAX

**Mid-Continent**

| | |
|---|---|
| 132-134 A.M.P. | 0.6 |

• Heating distillate prices in the Group 3 area advanced another 0.125 cent a gallon with most suppliers meeting the increase by December 21. Residual prices moved up in the same area by $0.05 a barrel. Grade 26-70 natural gasoline is selling for 6.0 cents a gallon on the Group 3 market. Retail gasoline prices tend to be more stabilized in upper East Coast areas.

### PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

| | Refinery prod. | Total demand |
|---|---|---|
| Gasoline: | | |
| Four weeks ended 12-16-55 | 3,814 | 3,677 |
| September 1955 | 3,696 | 3,877 |
| November 1954 | 3,428 | 3,505 |
| December 1954 | 3,515 | 3,455 |
| Middle Distillate: | | |
| Four weeks ended 12-16-55 | 2,065 | 3,081 |
| September 1955 | 1,899 | 1,565 |
| November 1954 | 1,976 | 2,247 |
| December 1954 | 7,049 | 3,112 |
| Residual fuel: | | |
| Four weeks ended 12-16-55 | 1,218 | 1,869 |
| September 1955 | 1,061 | 1,350 |
| November 1954 | 1,120 | 1,560 |
| December 1954 | 1,187 | 1,819 |

### CRUDE PRICES GRAVITY SCHEDULE

| | Signal Hill, Calif.* | Okla-homa, Kansas | Gulf Coast Tex.† | West Tex.‡ |
|---|---|---|---|---|
| 14-14.9 | $1.97 | | | |
| 15-15.9 | 2.03 | | | |
| 16-16.9 | 2.09 | | | |
| 17-17.9 | 2.15 | | | |
| 18-18.9 | 2.21 | | | |
| 19-19.9 | 2.27 | | | |
| 20-20.9 | 2.33 | $2.50 | | $2.37 |
| 21-21.9 | 2.39 | 2.52 | | 2.39 |
| 22-22.9 | 2.45 | 2.54 | | 2.41 |
| 23-23.9 | 2.51 | 2.56 | | 2.43 |
| 24-24.9 | 2.57 | 2.58 | $2.91 | 2.45 |
| 25-25.9 | 2.63 | 2.60 | 2.93 | 2.47 |
| 26-26.9 | 2.69 | 2.62 | 2.95 | 2.49 |
| 27-27.9 | 2.76 | 2.64 | 2.97 | 2.51 |
| 28-28.9 | 2.83 | 2.66 | 2.99 | 2.53 |
| 29-29.9 | 2.91 | 2.68 | 3.01 | 2.55 |
| 30-30.9 | 2.97 | 2.70 | 3.03 | 2.57 |
| 31-31.9 | 3.04 | 2.72 | 3.05 | 2.59 |
| 32-32.9 | 3.12 | 2.74 | 3.07 | 2.61 |
| 33-33.9 | | 2.76 | 3.09 | 2.63 |
| 34-34.9 | | 2.78 | 3.11 | 2.65 |
| 35-35.9 | | 2.80 | 3.13 | 2.67 |
| 36-36.9 | | 2.82 | 3.15 | 2.69 |
| 37-37.9 | | 2.84 | 3.17 | 2.71 |
| 38-38.9 | | 2.86 | 3.19 | 2.73 |
| 39-39.9 | | 2.88 | 3.21 | 2.75 |
| 40 and above | | 2.90 | 3.23 | 2.77 |

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Sour. Includes New Mexico Permian.

Effective dates. California, October 17, 1955; east of California, June 15, 1953; Pennsylvania Grade, November 1, 1955.

### FLAT CRUDE PRICES

Representative posted schedules per barrel.

| | |
|---|---|
| Louisiana: | |
| Cotton Valley (distillate) | $3.00 |
| Cotton Valley (Holloway crude) | 2.95 |
| Texas: | |
| East Texas | 2.90 |
| Chapel Hill | 2.83 |
| Conroe | 3.13 |
| Van | 2.73 |
| Pennsylvania Grade: | |
| Bradford | 3.85 |
| Middle District | 3.72 |
| Southwest Pennsylvania | 3.43 |
| West Virginia | 3.31 |
| Buckeye Grade | 3.25 |
| Zanesville Grade | 2.92 |
| Illinois Basin | 3.00 |

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1—100 H.P. G.A.W. Cooper-Bessemer Gas Engine with parts to convert to Diesel fuel. Good condition.
2—VIK Waukesha
3—FCU Waukesha
2—XAH Waukesha
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Good condition. Location 16 miles North Nocona, Texas.
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500 Trinity Universal Bldg.,
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DROP—BED "TYPE" $2,731.48
FLAT—BED "TYPE" 2,638.89
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Worth. 12" KUF Diesel drive
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**TRANSFER PUMPS**
Duplex from 4x3x4 to 10x7x12

**FURNACE TUBES**
4-6% Chrome ½ New Cost

**TOWERS—COLUMNS**
4'x59' 160 PSI 23 trays.
2'x47' 375 PSI 20 trays.
3'x49' 425 PSI 28 trays.
7'x54' 150 PSI 20 trays.
7'6"x41' 160 PSI Reactor.

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Light Oil 10 million BTU.

**HEAT EXCHANGERS**
94 to 550 sq. ft. Steel Tubes.
140 to 440 sq. ft. Adm. Tubes.

**COMPRESSORS**
1406 SCFM Gas Driven 250 PSI
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**ETHYL BLENDING PLANT**
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153 HP 160 PSI Water Tube (3)
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FOR SALE—Two Walker-Neer Model C-34 Spudders. Trailer mounted. Waukesha 145GKU Engines complete with all drilling in tools, doghouses, light plants, 7500 ft. ¾" drill lines, 7,000 ft. ⅝" sand line. Inventory on request. Box J-284, The Oil and Gas Journal, Tulsa, Oklahoma.

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1—Wyatt 30" x 70' Stabilizer 160# 30 tray
3—Absorbers, 14" x 40', 20" x 50', 160#
2—Wash Towers, 18" x 23', 150#
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1—Depropanizer, 20" x 35', 450#
1—Debutanizer, 12" x 26', 120#
3—Brinkman vertical tube furnaces 2, 1¼ mil. BTU/hr.
20—Brown fintube exchangers, 600# 140 sq. ft. 4-6 chrome.
20—Brown fintube exchangers, 600# 11, 21, 77, 101, 140 sq. ft.
3—Adm. heat exchangers 424, 346, 176 sq. ft.
3—Perco reactors 4500 gal., 8' x 12', 347 stls. st. 120#, 1000° F.
1—5' x 50' tower, 40 tray, 135# WP
1—7' x 30' Propane tank, 250# WP
1—10' x 50' Crude tower, 18 trays
1—6' x 34' Vacuum tower, 150#
1—2' x 50' tower, 24 trays
3—Welded tanks, 10' x 40', 10' x 30', 5' x 20'
3—St. exchs., 2000, 1500, 480 sq. ft.
9—Oilfield boilers, 125 hp., 275#
1—Ethyl lead plant
3—Penn. comp. 8 x 11 x 9, 12 x 11½ x 13, 10 x 6 x 11
2—Convection furnaces, 4-6 ch. tubing
1—Vapor phase cracking furnace
30—Welded storage tanks, 5000, 2000, 1000, 500 Bbl.
1—Waukesha anti-knock machine
6—Hi-vol pumps, 10 x 7 x 18, 10 x 6 x 12, 6 x 4 x 12, 6 x 3 x 8
30—Duplex piston pumps, all sizes
1—10' x 30' asphalt still
6—Steel Bldgs., 20 x 150, 12 x 20, 20 x 40, 20 x 20.
2—Pritchard cooling towers, Adm. Bentube exchanges
1—BS&B Oil & gas separator, 10.7 mcf, 3500 Bbl./day.

**COMPRESSOR STATION—BALT., MD.**

3—600 hp IR KVG Gas Comp.
1—MWK 2400 sq. ft. adm. exch. 150#

**FINAL LIQUIDATION, LEVELLAND, TEX.**

6' x 58' ch lined tower, 50#, 21 tray
8' x 40' ch lined vessel, 90#
30,000 ft., 4, 6 in. pipe
5,000 ft. 2", 4", 4-6 ch pipe

**EQUIPMENT ELSEWHERE**

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7' x 115' 56 tray
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**HEAT EXCHANGERS**

6—Adm. 785, 742, 425 sq. ft.
3—St. 2000, 785 sq. ft.
30—Atmospheric Bentube exch., stls and Adm. 715, 470 sq. ft.
30—304 SS shell & tube condensers 100-1000 sq. ft.

**MISCELLANEOUS**

Lab Petro-chem furnace 50,000 BTU/hr
Gould 4" Pump 400 gpm 1600' hd
B-J hot oil pump 3 x 9, 13 st. 325 gpm. 4620' hd
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Tremendous selection stainless steel and steel valves ½" - 6"

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**Inspection Date: January 8th till time of sale.**

**List of Equipment as Follows:**

1954—212 Int. Tandem, Propane, w/Mdl. 658 Double Drum "Franks" Well Servicing Unit, 13⅜ Inch to 10¾ Inch 68 Ft. Telescoping Pole, 3 Sheave Crown & Cross Sheave equipped w/Rod & Tubing Tools & ⅝ Inch Swabbing Line.
1954—192 Int. Tandem, Propane, w/Mdl. 44 Double Drum "Franks" Well Servicing Unit, 13⅜ Inch to 10¾ Inch 68 Ft. Telescoping Pole, 3 Sheave Crown & Cross Sheave equipped w/Rod & Tubing Tools & Approx. 7000 Feet of ⅝ Inch Swabbing Line.
1953—192 Int. Tandem, Propane, w/Mdl. 65 Double Drum "Franks" Well Servicing Unit, 13⅜ Inch to 10¾ Inch 68 Ft. Telescoping Pole, 3 Sheave Crown & Cross Sheave equipped w/Rod & Tubing Tools & ⅝ Inch Swabbing Line.
1953—192 Int. Tandem, Propane, w/Mdl. 65 Double Drum "Franks" Well Servicing Unit, 13⅜ Inch to 10¾ Inch 68 Ft. Telescoping Pole, 3 Sheave Crown & Cross Sheave equipped w/Rod & Tubing Tools & Approx. 8000 Feet of ⅝ Inch Swabbing Line.
1953—210 Int. Tandem, Propane, w/Mdl. 658 Double Drum "Franks" Well Servicing Unit, 13⅜ Inch to 10¾ Inch 68 Ft. Telescoping Pole, 3 Sheave Crown & Cross Sheave equipped w/Rod & Tubing Tools & ⅝ Inch Swabbing Line.
1950—Int. Tandem, Propane, w/Brownlipe Transmission, Mdl. 65 Single Drum "Franks" Well Servicing Unit, 13⅜ Inch to 10¾ Inch 68 Ft. Telescoping Pole, 3 Sheave Crown & Cross Sheave equipped w/Rod & Tubing Tools.
1949—KB8F Int. Tandem, Propane, w/450 Mtr. equipped w/Mdl. 658 Single Drum "Franks" Well Servicing Unit, 10¾ Inch to 8⅝ Inch 65 Ft. Telescoping Pole, Single Sheave Crown & Cross Sheave, 11,000 Feet of ⅝ Inch Swabbing Line & Swabbing Tools.
1948—KB8F Int. Tandem, Propane, w/401 Mtr. equipped w/Mdl. 65 Single Drum "Franks" Well Servicing Unit, 10¾ Inch to 8⅝ Inch 65 Ft. Telescoping Pole, Single Sheave Crown & Cross Sheave, 9000 Feet of ⅝ Inch Swabbing Line & Swabbing Tools.
1946—K-11 F Int. Tandem, Gasoline, w/Mdl. 5000 "Franks" Well Servicing Unit, 10¾ to 8⅝ Inch 65 Ft. Telescoping Pole, 3 Sheave Crown & Cross Sheave w/Rod & Tubing Tools.
1946—K-11 F Int. Tandem, Propane, w/Mdl. 5000 "Franks" Well Servicing Unit, 10¾ to 8⅝ Inch 68 Ft. Telescoping Pole, 3 Sheave Crown & Cross Sheave w/Rod & Tubing Tools.
1942—K-10 F Int. Tandem, Propane, w/Mdl. East Texas Super "Franks" Well Servicing Unit, 13⅝ to 10⅜ Inch 68 Ft. Telescoping Pole, 3 Sheave Crown & Cross Sheave, Approx. 9000 Feet ⅝ Inch Line, Rod & Tubing Tools.
1951—LF-174 Int. Tandem Road Truck w/Fifth Wheel, Leland Oil Field Bed, Headache Rack, Braden Winch & Brownlipe Transmission.
1954—Ford F-6 Oil Field Bed, Tulsa Winch, 2-Speed Rear-end, 3-Speed Brownlipe & Power Tower.
13 Pickup Trucks, All Equipped w/Heavy Duty Rear Bumpers & Tool Boxes.
2—1953, F-100 Fords, 4-Speed Transmission; 1—1951, F-1 Ford; 4—1950 F-1 Fords; 3—1949, F-1 Fords; 2—1953 F-1 ords & 1—1953 Int. Pickup.
3 Sets of BJ Powermatic Air Tubing Tongs, Trailer Mounted w/Waukesha Motor.
2 1955 Ford Customline 2-Door Passenger Cars; 1—1955 Ford Mainline 2-Door Passenger Car.
1 Single Axle Shopmade Pole Trailer w/Budd Wheels.
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1 Tool shed, 16x30.
1 Tool Building 26x30.
10 Welded casing Racks made out of 4" drill pipe.
1 Truck Garage 31x61.
Yard is enclosed with 8' Wire Mesh Fence.

**Contact KIOWA OIL COMPANY,**
**717 Union National Bank Bldg.,**
**Wichita 2, Kansas,**
**Phone FO 3-8013.**

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3—800# MMCF Absorbers with Scrubbers, etc.
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1—Fluor "Counterflo" Induced Draft Cooling Tower Complete.

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### EQUIPMENT WANTED

WANTED—Truck mounted 2500 foot rotary rig, must be good shape and priced right. Box 650, Great Falls, Montana.

MAYHEW 1000 with 5x6 Wheatley Pump and equipped for 15' drill rods. 750 gal. class water truck. Trucks should be of late model. TEXAS SEISMOGRAPH COMPANY, Box 2069, Wichita Falls, Texas.

EQUIPMENT WANTED—Approximately 600 feet 4½" OD 16 lb. Seamless Pipe, new or good used condition, plain end or threaded. P. O. Box 4444. Telephone MElrose 7-3386. Oklahoma City 9, Oklahoma.

### HELP WANTED

DRILLING SUPERINTENDENT with engineering or technical background, for employment in Italy. Must read and write Italian. Box J-263, The Oil and Gas Journal, Tulsa, Oklahoma.

INDEPENDENT OIL COMPANY wants Geologist with minimum of three years experience, North and West Central Texas. Should be familiar with all phases of petroleum geology and land work. Submit complete resume and photograph, indicating education, experience and salary requirements. Our employees are aware of this ad. Box J-291, The Oil and Gas Journal, Tulsa, Oklahoma.

### HELP WANTED

GEOLOGIST—Aggressive independent oil company has opening for geologist to headquarter in Midland, Texas. Approximately five years experience in Permian Basin required. In replying, give past employment record, educational background, etc. Replies held in strict confidence. Box J-288, The Oil and Gas Journal, Tulsa, Oklahoma.

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**Experienced graduate engineers for immediate openings in Saudi Arabia and New York City. For engineering work in development, production, drilling, process, and oil and gas engineering on primary and secondary recovery problems.**

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**Phone LUther 4-3461**

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Salary commensurate with background and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

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SEISMOGRAPH Computer. Must be experienced and free to travel. Box J-234, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER—With mechanical training or experience to work in Company's Houston office, rating and sizing heat exchangers, centrifugal pumps, compressors, and related equipment. Box J-265, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Junior Mechanical Engineer. Degree preferred but not essential if applicant has refinery, gasoline plant, or chemical plant experience. Give complete work experience, salary expected and personal data in first letter. Write Box J-286, The Oil and Gas Journal, Tulsa, Oklahoma.

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has opening for man experienced in valuation of oil and gas reserves. In reply please give resume of experience and salary expected. All replies held confidential.

**Box J-275,**

**The Oil and Gas Journal,**

**Tulsa, Oklahoma.**

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Petroleum Engineer between 28 and 35 years of age with field experience and interest in reserves and valuation work. New York financial institution offers opportunity for experience and advancement. Please send resume of personal history, experience, and recent photograph. Replies will be considered as being strictly confidential. Write P. O. Box 226, Church Street Station, New York 8, N. Y. Dept. 12.

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WANTED: Producing Royalties by Principal. Submit, Engineer's report—Run tickets and Price. R. M. Sims, P. O. Box 447—Phone 1024, Crockett, Texas.

### HELP WANTED

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

PRODUCTION EQUIPMENT SALESMAN: Illinois, Indiana, and Kentucky. Prefer man already contacting major and independent operaotrs in area. Salary Open. Box J-281, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED IMMEDIATELY: Engineer; two or three years experience, for drilling production and reservoir work in Midwest area. Salary commensurate with training and experience. Write Box J-294, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER—Mechanical or Chemical for development work in gasoline testing laboratory in Metropolitan New York. Experience in gasoline quality tests including CFR engine is desirable. State age, education, experience, and salary desired. Box J-292, The Oil and Gas Journal, Tulsa, Oklahoma.

***Plant Equipment Inspectors***

Graduate engineers with minimum 5 years' experience in design or inspection of petroleum processing plants and equipment. Major part of experience must have been in inspection work entailing general knowledge of all facilities. Develop inspection methods, supervise and conduct inspections and advise operations on codes and equipment limitations in a major oil installation located in Saudi Arabia.

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LANDMAN or contact representative for drilling contractor available for Rocky Mountain area. 18 years experience Land, Production, Drilling. Box J-282, The Oil and Gas Journal, Tulsa, Oklahoma.

PROJECT ENGINEER—12 years experience refinery projects. Foreign work 7 years. Desires position in U.S.A. Prefer West Coast. Reply Box J-267, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN—Employed, 4 years Major; Rockies; Titles, Leasing, Joint Ventures, Units, Personnel. Veteran with B.A. and L.L.B. Seeking challenge with independent or small company. Box J-293, The Oil and Gas Journal, Tulsa, Oklahoma.

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**R. E. (BUCK) CLEMENT**

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# Equipment Men

## Acme Oil Tool Names Moore As Bowen Tool Specialist

Appointment of R. B. (Bob) Moore as Bowen Tool specialist has been announced by Acme Oil Tool Co. of Oklahoma City. Prior to joining Acme, Moore had 7 years' experience testing and diamond coring with Bowen Tool. Before World War II he was with Loffland Brothers, drilling contractors.

## Technical Oil Tool Names Kilgore to Service Post

Gail Kilgore has been employed as a service representative for Technical Oil Tool Corp., H. H. (Pete) Peters, president, has announced. Kilgore will be a representative for the Victoria, El Campo, and Refugio, Tex., areas. He will make his headquarters at Victoria and will operate under the supervision of Totco's Gulf Coast Division Manager Ray O'Rear.

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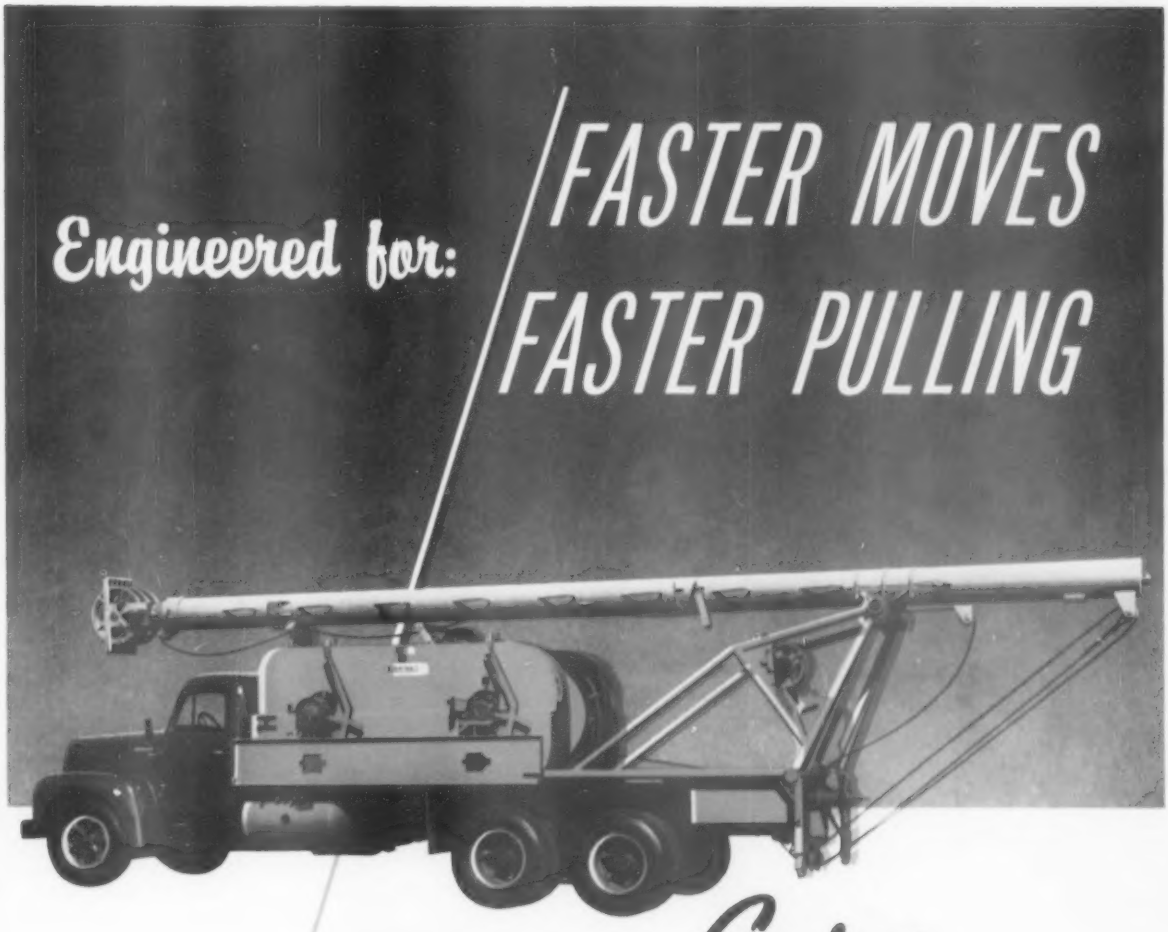

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